TROY ASBESTOS PROPERTY EVALUATION WORK PLAN
(FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN)

FOR THE

TROY ASBESTOS PROPERTY EVALUATION PROJECT

Troy Operable Unit Number 7
of the Libby Asbestos Superfund Site

March 2007

Prepared for:

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY
Remediation Division
P.O. Box 200901
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Contract Number 402014
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Additional copies of the Troy Asbestos Property Evaluation Project documents can be made available to the above-listed persons for further distribution within their respective agencies.

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ACRONYMS AND ABBREVIATIONS

f/cc	Fibers per cubic centimeter
s/cm2	Structures per square centimeter
AHERA	Asbestos Hazard Emergency Response Act
amsl	Above mean sea level
ASTM	ASTM International (formerly the American Society for Testing and Materials)
CDM	Camp Dresser & McKee
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
cm^2	Square centimeters
CPR	Cardiopulmonary resuscitation
DEQ	Montana Department of Environmental Quality
DPHHS	Montana Department of Public Health and Human Services
DQO	Data quality objective
EDD	Electronic data deliverable
eLastic	Electronic Libby Asbestos Sample Tracking Information Center
EPA	U.S. Environmental Protection Agency
ESAT	Environmental Services Assistant Team
FSDS	Field sampling data sheet
GIS	Geographic Information System
GPS	Global positioning system
HASP	Health and safety plan
HAZWOPER	Hazardous waste operations
IFF	Inspection field form
LA	Libby amphibole
Microvac	Microvacuum
mm	Millimeters
OSHA	Occupational Safety and Health Administration
OU	Operable unit
PDA	Portable digital assistant
PDF	Personal data format
PEL	Permissible exposure limit
PPE	Personal protective equipment
PLM	Polarized light microscopy
QA	Quality assurance
QC	Quality control

ACRONYMS AND ABBREVIATIONS
(Continued)

SOP	Standard operating procedure
STEL	Short-term exposure limit
TAPE	Troy Asbestos Property Evaluation
Tetra Tech	Tetra Tech EM Inc.
TWA	Time weighted average
µm	Micrometers
VCI	Vermiculite-containing insulation
Volpe Center	John A. Volpe National Transportation Systems Center

1.0 PROJECT DESCRIPTION AND BACKGROUND

Tetra Tech EM Inc. (Tetra Tech) received Task Order No. 41 from the Montana Department of Environmental Quality, Remediation Division (DEQ), under DEQ Contract No. 402014. The purpose of this task order is to complete a Troy Asbestos Property Evaluation (TAPE) work plan for the Troy Operable Unit Number 7 (OU7) of the Libby Asbestos Superfund Site. The United States Environmental Protection Agency (EPA) is the lead agency for the Libby Asbestos Superfund Site. DEQ is the lead agency for the Troy OU7 through a cooperative agreement with EPA. EPA requested that DEQ lead the Troy OU7 for financial savings and resource allocation. The TAPE work plan describes the field and property inspections and sample collection necessary to identify if and where amphibole asbestos is present within the Troy OU7 and the concentrations and quantity, if present. This information will be used at a later date to support cleanup decisions.

This TAPE work plan document is a combined field sampling plan and quality assurance project plan and is referred to as the TAPE work plan. Tables and figures in this document follow the first reference in the text. Appendix A contains the site-specific health and safety plan (HASP), Appendix B contains copies of project-applicable standard operating procedures (SOP), Appendix C is a list of equipment and supplies required for the project, Appendix D contains samples of information for residents, Appendix E contains printouts of the portable digital assistant (PDA) TAPE project field forms, Appendix F contains the Soil Sample Preparation quality assurance and quality control procedures (QA/QC), and Appendix G contains the laboratory QA/QC procedures.

1.1 PROJECT BACKGROUND AND PURPOSE FOR SAMPLING

Troy, Montana is located 18 miles northwest of Libby, Montana. From the 1920s until 1990, an active vermiculite mine and associated processing operations were located at Libby. While it was in operation, the vermiculite mine in Libby may have produced 80 percent of the world's supply of vermiculite (EPA 2005). Processed and exfoliated vermiculite has been used primarily for insulation in buildings and as a soil amendment. The Libby vermiculite deposit is contaminated with amphibole asbestos. For decades, the processing of vermiculite ore and generation and disposal of waste materials resulted in widespread amphibole asbestos contamination of the Libby community. In 1999, EPA Region 8 dispatched an emergency response team to investigate media reports of amphibole asbestos contamination and high rates of asbestos-related disease in Libby. Subsequent environmental investigations have found many areas in and around Libby contaminated with a form of amphibole asbestos known as Libby amphibole.

The health effects from airborne exposure to the more common commercially used or encountered asbestos mineral forms (chrysotile, tremolite, actinolite, anthophyllite, amosite, crocidolite) include: (1) pleural disease (plaques, diffuse thickening, calcifications, and pleural effusions), (2) interstitial disease (asbestosis), (3) lung cancer, and (4) mesothelioma (a rare cancer of mesothelial cells in the pleura or peritoneum). The observed health effects associated with exposure to asbestiform amphibole fibers (Libby amphibole) (Meeker and others 2003) at the Libby site have been well documented and are clearly consistent with illnesses seen due to exposure with the more common asbestos minerals (as noted below).

Studies performed in the early 1980s by researchers from McGill University (McDonald and others, McDonald, Sebastien, and Armstrong 1986) and the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH) (Amandus and others1987, Amandus and others 1987, Amandus and Wheeler 1987) found that former employees of the Libby vermiculite mine had significantly increased pulmonary morbidity and mortality from asbestosis and lung malignancies. Researchers at NIOSH who studied the annual chest x-rays of mine and mill workers with at least 5 years tenure (between 1975 and 1982) also found an increased prevalence of the radiographic abnormalities associated with asbestos-related disease. A recent follow-up study of Libby vermiculite workers who were previously evaluated in the 1980s, found that "this small cohort of vermiculite miners, exposed to amphibole fibers in the tremolite series, has suffered severely from both malignant and non-malignant respiratory disease" (McDonald and others 2002). The overall proportionate mortality among the group for mesothelioma (4.2 percent) was extremely high, being similar to that seen for crocidolite (considered by many to be the most toxic form of asbestos) miners in South Africa (4.7 percent) and Australia (3.9 percent) (McDonald and others 2002; 2004). For comparison, the age-adjusted incidence of mesothelioma in the United States (1992 through 2002) was about 0.001 percent (1 case per 100,000) with the occurrence of cases being extremely rare prior to age 50 (SEER 2005).

More recent studies completed at the Libby site have also found increased mortality and morbidity among former workers, as well as others in the community without any direct occupational exposures to the mine or processing activities. A mortality study conducted by investigators from the CDC Agency for Toxic Substances and Disease Registry (ATSDR) found markedly elevated death rates of asbestosis, lung cancer, and mesothelioma for the Libby community for the 20-year period examined (1979 through 1998). Mortality from asbestosis was approximately 40 times higher than the rest of Montana and 60 times higher than the rest of the United States (ATSDR 2000; 2002).

Large-scale medical screening of over 7,300 individuals who worked or lived in Libby for at least six months prior to 1990 found significantly increased rates of asbestos-related radiologic abnormalities.

Approximately 18 percent (1,186 out of 6,668) of the participants with asbestos-related pleural abnormalities were identified by at least two out of three B-readers. The prevalence of pleural abnormalities increased with increasing exposure pathways, ranging from 6.7 percent for those who were not able to identify any specific exposure pathways aside from living in Libby to 34.6 percent for those who reported 12 or more specific exposure pathways. The majority of individuals (greater than 70 percent) with pleural abnormalities did not directly work for the mine or processing operations nor with any secondary contractors for the mine (Peipins and others 2003).

EPA began investigations in Libby through a two-phased approach. The first phase of the investigation was used to determine if a time critical removal action was warranted in Libby to protect human health, to identify potential major source areas, and to identify the appropriate analytical methods for measuring concentrations of Libby amphibole in those source materials (CDM 2002). EPA began time critical removal actions in Libby in 1999. The second phase of the investigation was used to collect detailed information about airborne concentrations that result from sources of contamination that are disturbed (CDM 2003b). The combined results from the two phases of the investigation include:

- Exposure to Libby amphibole is a threat to human health.
- Release of respirable Libby amphibole fibers occurs when source materials are disturbed.
- Source materials include vermiculite insulation, vermiculite products (building materials) and process wastes, and contaminated soils.
- Contaminated indoor dust found in residential and commercial properties is a potential exposure pathway.
- There is widespread presence of Libby amphibole throughout the Libby area.

As a result of the findings from the two phases of the investigation, and because the Libby Asbestos Superfund Site was listed on the National Priorities List in 2002, a further investigation of residences and businesses in the Libby study area boundary was warranted (EPA 2003b). EPA began the Libby Asbestos Superfund Site contaminant screening study, which was considered the first part of the remedial investigation, in 2002. The ongoing objective of the contaminant screening study is to obtain information concerning the presence and nature of Libby amphibole contamination at properties in Libby (CDM 2003a). As of January 2007, EPA and their contractors have investigated approximately 4,000 properties in the Libby area through the contaminant screening study.

The purpose of the TAPE is to characterize the nature and extent of Libby amphibole source contamination present in the Troy OU7 boundaries. The investigative approach is similar to that of the contaminant screening study carried out in Libby, but makes improvements based on lessons learned from those activities. EPA believes that the nature of Libby amphibole contamination and associated exposure pathways present in Troy are similar to those observed in Libby. Limited investigations thus far have found that the vermiculite insulation found in Troy is similar in both morphology and mineralogy to the Libby amphibole found in Libby (USGS 2005). The draft Troy Conceptual Site Model (Section 1.2) illustrates that potential exposures in Troy are similar to those in Libby OU4. Therefore, a systematic screening of Troy area residences, public areas, schools, and businesses is necessary to gather sufficient information to determine how many Troy area properties are contaminated with Libby amphibole. Some vermiculite mine workers lived in Troy and commuted to the mine to work each day. The mine workers were exposed to asbestos-contaminated materials at the mine and processing facilities, and they transported asbestos-contaminated dust to their homes on clothes and equipment. Residents of Troy also traveled to Libby for everyday activities such as shopping, working (other than at the mine), and attending school sporting events and likely came in contact with Libby amphibole in Libby during these frequent visits. In addition, the asbestos-contaminated vermiculite ore and waste materials in varying forms may have been used for amending soils (as fill or as a conditioner), building materials (plaster, concrete, or chinking amendment), wood burning, spilled or placed on transportation corridors, and for insulating buildings in and around Troy.

1.2 CONCEPTUAL SITE MODEL

Exposure to airborne asbestos through inhalation is the main exposure route of concern resulting in malignant and non-malignant respiratory diseases. Oral ingestion of asbestos in environmental settings may also be a potential route of exposure and concern but acquisition of the data to fully evaluate the ingestion of Libby amphibole is not included in this TAPE work plan. Figure 1-1 presents a draft conceptual site model for Troy, which identifies exposure pathways by which Libby amphibole asbestos fibers from the Libby mine might be inhaled by humans. The primary inhalation pathways are inhalation of outdoor ambient air, air near disturbed soil, and indoor air. Additional potential exposure pathways include air near unenclosed sources (such as in attics) and air near breached walls. The draft conceptual site model will be refined as additional data are acquired and the understanding of actual transport and exposure pathways for Troy is improved. It is not the intent of this work plan to investigate all pathways identified in the conceptual site model. The bolded pathways shown on Figure 1-1 show that the specific pathways to be investigated under this work plan include air near unenclosed sources, air near breached walls, indoor air, air near disturbed soil, and outdoor ambient air. Future work plans will be prepared to investigate the remaining pathways.

Figure 1-1

1.3 TROY SITE INFORMATION

The Troy OU7 is located along the Kootenai River valley at an elevation ranging from 1,850 feet above mean sea level (amsl) at the northern end of the OU7 to 2,500 feet amsl on the mountain slopes surrounding the valley. The Troy OU7 is approximately 8 miles long and up to 1.8 miles wide. Topography of the Troy OU7 consists of relatively flat river valley terraces on both sides of a gently graded Kootenai River. Several tributaries flow into the Kootenai River along the 8-mile stretch contained within the Troy OU7. Figure 1-2 provides a topographic view of the Troy OU7 boundaries. The Troy OU7 boundaries were selected based on population density and proximity to the Town of Troy.

1.4 SCHEDULE

The TAPE inspection and sampling field work will begin in the summer 2007 and will require approximately 30 weeks to complete. A training session for all field personnel will be completed from April 23 through 27, 2007 and the inspection and sampling will begin on April 30, 2007. The 2007 field season is scheduled to end on September 14 for a total of 20 weeks. An additional 10 weeks of inspection and sampling will be completed in 2008. Tetra Tech will prepare a TAPE field summary report approximately 90 days after the completion of the field work. The draft TAPE project report would be submitted to the DEQ and others approximately 60 days after receiving the analytical data.

1.5 WORK PLAN ORGANIZATION

This TAPE work plan is organized into eight sections. Section 1.0 is this introduction. The contents of Sections 2.0 through 8.0 are briefly described below.

- Section 2.0 Project Organization. This section identifies key project personnel and project responsibilities and provides an organizational chart and a table of participants with contact information.
- Section 3.0 Work Plan Rationale. This section describes the data quality objective (DQO) steps used to establish the quantity and the quality of data to support decision making.
- Section 4.0 Field Procedures. This section describes the activities that will take place during the property evaluations. The SOPs for each activity and the HASP are referenced and detailed.
- Section 5.0 Field Quality Control Procedures. This section discusses the field QA/QC procedures, including equipment decontamination, QC samples, field documentation, and chain of custody. Also discussed in this section are QA procedures used at the Libby Asbestos Superfund Site (EPA 2000c).

Figure 1-2: Topographic View of the Troy OU7

- Section 6.0 Data Management. This section describes how the data will be handled after they have been received from the Libby V2 database.
- Section 7.0 QA/QC Procedures. This section describes the procedures that will be taken to ensure the quality and integrity of the TAPE data.

Finally, references used in preparing this document are presented in Section 8.0.

2.0 PROJECT ORGANIZATION

Table 2-1 presents the responsibilities and contact information for key personnel involved in the TAPE inspection and sampling project. In some cases, more than one responsibility has been assigned to a person.

The John A. Volpe National Transportation Systems Center (Volpe Center) is providing support to EPA Region VIII, including management of the Libby V2 database which is used to store sampling, analytical, and other pertinent data from the Libby Asbestos Superfund Site. Tetra Tech will transfer Troy data to and obtain data from EPA and their contractors. Tetra Tech will transfer custody of all inspection soil and dust samples to the EPA Environmental Services Assistance Team (ESAT) mobile soil preparation laboratory after the samples have been recorded and organized. ESAT will then be responsible for custody and quality assurance of the samples until delivery to a contract laboratory for analysis. ESAT will also oversee laboratory schedules and track data deliverables. Tetra Tech will also collect stationary air, personnel air monitoring, and initial dust samples and deliver them to Camp Dresser & McKee (CDM) for analysis at the EMSL laboratory in Libby. Tetra Tech will oversee laboratory schedules and track data deliverables for these samples.

2.1 MONTANA DEQ OVERSIGHT

The DEQ project officer (or designee) will provide oversight of all field activities associated with this TAPE project. DEQ oversight personnel will have the ability to inspect all field and sampling activities, determine the appropriateness of the recorded data, and ensure that all activities comply with standard practices that meet the project objectives. Before any oversight is conducted, the Tetra Tech on-site health and safety coordinator will brief the DEQ oversight personnel to ensure safe practices are maintained throughout the TAPE field effort.

TABLE 2-1
KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
Catherine LeCours	DEQ	Project Officer	• Monitors performance of the contractor • Reviews and approves QA measures • Consults with the EPA and Volpe • Reviews and approves all work plans (FSP/QAPP) • Provides coordination with ESAT and EPA • Provides primary interface with the Troy community and disseminate project information to the public	Montana Department of Environmental Quality PO Box 200901 Helena, MT 59620-0901 clecours@mt.gov (406) 841-5040 (406) 431-1630 (cell)
J. Edward Surbrugg	Tetra Tech	TAPE Project Manager	• Responsible for implementing all activities called out in the task order • Supervises preparation of work plan and approves document • Monitors and directs field activities to ensure compliance with work plan requirements • Provides coordination with DEQ Project Officer • Disseminate project information to interested parties and Troy property owners and direct questions to DEQ	Tetra Tech, Helena, MT 7 West 6th Avenue Helena, MT 59601 edward.surbrugg@ttemi.com (406) 442-5588 (406) 459-0881 (cell)
Mark Stockwell	Tetra Tech	- TAPE Field Team Leader - TAPE QA/QC Manager	• Responsible for directing and coordinating day-to-day field activities conducted by Tetra Tech • Verifies that field sampling and measurement procedures follow work plan • Conducts field audits for QA/QC • Provides DEQ Project Officer and TAPE project manager with regular reports on status of field activities • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech, Sandpoint 324 Larchwood Drive Sandpoint, ID 83860 mark.stockwell@ttemi.com (208) 263-4524 (916) 715-8442 (cell)

TABLE 2-1
(Continued)

KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
	Tetra Tech	Troy Field Data Coordinator	• Responsible for working with TAPE project manager and TAPE field team leader to schedule TAPE inspections • Responsible for compiling, organizing, and auditing field data sheets and samples submitted daily by field teams • Responsible for transferring field data sheets and samples to the ESAT Troy Sample Coordinator • Coordinate with ESAT and EPA managers on sample delivery schedules and logistics • Reviews laboratory data before release to project team • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech DEQ Troy Information Center 303 N. Third Street P.O. Box 1170 Troy, MT 59935 (406) 295-9238
Bryan Erickson	Tetra Tech	On-site TAPE Safety Officer	• Responsible for implementing health and safety plan and for determining appropriate site control measures and personal protection levels • Conducts safety briefings for Tetra Tech and site visitors • Can suspend operations that threaten health and safety • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech DEQ Troy Information Center 303 N. Third Street P.O. Box 1170 Troy, MT 59935 (406) 295-9238
Rick Ecord	Tetra Tech	Tetra Tech Health and Safety Officer	• Approve the Troy Health and Safety Plan. • Provide a resource for all health and safety issues.	
Ed Madej	Tetra Tech	Database and Geographic Information System Manager	• Responsible for developing, monitoring, and maintaining project database and property maps • Responds to requests from TAPE project manager and TAPE field team leader to provide copies of property maps to field teams on a daily basis • Imports laboratory electronic data deliverables into the Troy project Scribe database. • Works with EPA data and graphic managers to generate needed reports and maps from the Troy project Scribe database	Tetra Tech, Helena, MT 7 West 6th Avenue Helena, MT 59601 edward.madej@ttemi.com (406) 442-5588

TABLE 2-1
(Continued)

KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
10 members	Tetra Tech	Field Team Member	• Responsible for conducting TAPE inspections and sampling as described in the work plan and for following SOPs. • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech DEQ Troy Information Center 303 N. Third Street P.O. Box 1170 Troy, MT 59935 (406) 295-9238
Mr. Martin McComb	ESAT	Mobil Soil Preparation Laboratory	• Responsible for preparation of all soil and dust sample • Shipping of samples to laboratories • Tracking laboratory schedules and deliverables	Mr. Martin McComb U.S. EPA, Region 8 1595 Wynkoop St. Denver, CO 80202-1129 (303) 312-6312
Bonnie Lavelle	EPA	Remedial Project Manager	• Observes and monitors performance of DEQ and contractor • Consults with other Libby RPMs and with Region 8 • Provides communication with public and other agencies	Ms. Bonnie Lavelle U.S. EPA, Region 8 1595 Wynkoop St. Denver, CO 80202-1129 (303) 312-6312

Notes:

DEQ	Montana Dept. of Environmental Quality	EPA	U.S. Environmental Protection Agency
ESAT	EPA Environmental Services Assistance Team	FSP	Field Sampling Plan
QAPP	Quality Assurance Project Plan	SOP	Standard Operating Procedure
TAPE	Troy Asbestos Property Evaluations	TBD	To be determined
Tetra Tech	Tetra Tech EM Inc.	QA/QC	Quality Assurance/Quality Control

2.2 NON-AGENCY OBSERVATION OF FIELD ACTIVITIES

EPA will be allowed the opportunity to observe the TAPE project field activities. The request for non-Agency observation of field activities must first be coordinated with and approved by the DEQ project officer and property owner. When inspection and sampling are being conducted on a Troy property and the owners are present, the property owners will have the opportunity to (1) observe Tetra Tech field inspection and sampling, (2) obtain copies of the field forms and property sketches completed for the property, (3) obtain a receipt for samples collected, and (4) obtain a portion of samples collected (at the cost of the property owner). The Tetra Tech field team will brief property owners about the types of sampling and methods for completing the TAPE inspection and sampling; however, the Tetra Tech field team will not interpret results or make conclusions from the inspection and sampling for the property owner.

If Tetra Tech obtains soil or dust samples at a property, Tetra Tech will, if requested, provide the property owner with a receipt for the samples identifying the number and types of samples collected. Sample receipts and a summary of the inspection notes will be available to property owners the day after sample collection at the Troy project office. No sample results will be available during the TAPE inspection and sampling. An individual property owner who requests a portion of a sample must supply all necessary materials required for sampling, as well as arrange and pay for laboratory analysis of all additional samples collected.

2.3 SPECIAL TRAINING AND CERTIFICATES

Tetra Tech personnel who work on the TAPE project will have met the Occupational Safety and Health Administration (OSHA) training requirements defined in Title 29 Code of Federal Regulations (29 CFR) Part 1910.120(e) for working on hazardous waste sites. These requirements include: (1) 40 hours of formal off-site instruction; (2) a minimum of 3 days of actual on-site field experience under the supervision of a trained and experienced field supervisor; and (3) 8 hours of annual refresher training.

Tetra Tech personnel working on the TAPE project must read and abide by the stipulations and guidelines set forth in Tetra Tech's HASP, which is Appendix A to this TAPE work plan. The HASP provides written instructions for health and safety training requirements, personal protective equipment (PPE) requirements, a spill containment program, and health-hazard monitoring procedures and techniques. At least one member of every Tetra Tech field team will maintain current certification in the American Red Cross "Multimedia First Aid" and "Cardiopulmonary Resuscitation (CPR) Modular" or equivalent.

Copies of Tetra Tech's health and safety training records, including course completion certifications for the initial and refresher health and safety training, specialized Asbestos Hazard Emergency Response Act (AHERA) training, and first aid and CPR training, are maintained in the Helena Tetra Tech office files for all TAPE field team members.

Before work begins at a specific project site, Tetra Tech personnel are required to undergo site-specific training that thoroughly covers the following areas:

- Names of personnel and alternates responsible for health and safety at a project site
- Health and safety hazards present on site, including heat, physical stressors, insects and other potential biological hazards

- Libby amphibole-specific morphology and health risks
- Selection of the appropriate personal protection levels
- Correct use of PPE
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazardous substances, physical stressors (heat, cold), and other potential hazards
- Contents of the HASP
- Community relations
- Use of PDAs

3.0 TROY DATA QUALITY OBJECTIVES

This section presents the DQOs for the TAPE inspection and sampling project. The DQOs are qualitative and quantitative statements developed through the seven-step DQO process (EPA 2000a; 2000b). The DQOs help to clarify the study objectives, define the most appropriate data to collect and the conditions under which to collect the data, and specify tolerable limits on decision errors that will be used as the basis for establishing the quantity and quality of data needed to support decision-making. The DQOs are used to develop a scientific and resource-effective design for data collection. The seven steps of the DQO process for this TAPE project are presented in Table 3-1.

Background information for the Troy OU7 study area was discussed in Section 1.0. Figure 1-1 presents a draft conceptual site model where the exposure routes addressed in this TAPE are shown in bold. Because vermiculite, stoner rock, and other Libby amphibole-contaminated wastes were transported from the mine to Troy properties at irregular and unpredictable intervals, the locations where Libby amphibole contamination may be found are not predictable; DEQ has therefore determined that each property in the Troy OU7 (including privately-owned and publicly-owned property) will be investigated and screened. The properties may or may not contain a building or multiple buildings, specific use areas, common use areas, limited use areas, and non-use areas, grouped together as exterior use areas. Please see Section 4.4.3 for definitions and classifications of each exterior use area.

TABLE 3-1

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY OPERABLE UNIT

STEP 1: State the Problem

Section 1.0 of this work plan summarizes the history of the Libby Asbestos Superfund Site, identifies the key players and decision makers, illustrates the conceptual site model, provides justification for the investigation and screening for the Troy OU7, and identifies the schedule, budget, and necessary resources.

The following are problem statements associated with the Troy Properties investigation:

- Exposure to LA-contaminated vermiculite or waste product is a threat to human health (EPA 2000c).
- Respirable LA asbestos is released when source materials are disturbed (EPA 2000c).
- Potential source materials include VCI, LA-containing building materials, vermiculite waste products, soils contaminated with LA, and household dust.
- All contaminated source materials (for example, household dust, contaminated soils, or other sources) can potentially contribute to exposure pathways.
- LA-contaminated materials may be found randomly within the Troy OU7.
- All properties within the Troy OU7 should be evaluated for sources of LA contamination.

STEP 2: Identify the Decisions

Principle Discussion Question: Do sources of LA contamination exist at properties within the Troy OU7?

Property Identification Decisions:

- Identify the potential properties to investigate.
- Identify the number of buildings on each property.
- Identify the number and type of exterior use areas on each property in the Troy OU7.

Sampling Decisions:

Inspect properties within the Troy OU7 to visually and/or analytically confirm the presence or absence of LA contamination in attics, other interior building spaces, and exterior areas, and the concentrations of LA if present.

- Visual inspection and identification of LA in exterior and interior areas will be conducted pursuant to this work plan.
- Identify locations where interior dust samples will be collected.
- Identify locations where exterior soil samples will be collected.

TABLE 3-1 (continued)

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY OPERABLE UNIT

STEP 3: Identify Inputs to the Decisions
For each property, inputs to the decision include: • Review of aerial photographs to define individual properties, compile addresses, and determine if the property could be individually bought or sold. • Visual inspections of property to determine location and number of buildings, exterior use areas, living spaces, and attics. • Documented visible VCI in attics. • Documented visible VCI and other LA-containing building materials in interior building spaces (including but not limited to walls, crawl spaces, or other interior spaces). • Documented visible vermiculite in exterior use areas. • Interviews with residents, owners, occupants, and employees. • Visual inspection and analytical results from samples collected at each property.
STEP 4: Define Study Boundaries
• The Troy OU7 generally consists of the valley bottom from the north half of Section 25, Township 31 North, Range 34 West, and Section 30, Township 31 North, Range 33 West, east to the junction of Highways 56 and 2, and north to the northern edge of Section 21, Township 32 North, Range 34 West. Figure 1-2 shows the configuration of the study area for the Troy OU7. • Some properties (approximately 25) within the Troy OU7 have previously been inspected and sampled under the Libby OU4 investigation. Data have been recorded in the Libby database for these properties and will be integrated with additional sampling data from the TAPE. • Inspections and sampling will occur from late April to September 2007 and the summer of 2008.
STEP 5: Develop Decision Rules
The Record of Decision for the Troy OU7 will identify the specific parameters, conditions, and concentrations of LA that determine if a source exists at an individual property and if that source requires cleanup. Currently, EPA is using the action levels of 500 structures per square centimeter (s/cm^2) for dust and 0.2 percent for soil to determine properties that are eligible for a non-time critical removal action. This work plan considers the cleanup criteria identified in the action level memorandum as guidelines for data collection needs. However, the cleanup criteria may change before cleanup activities begin in Troy. This work plan details how DEQ will collect sufficient and defensible information essential to support future cleanup decisions. That information includes conversations with property owners and other anecdotal information regarding historical use of vermiculite, VCI, and other LA containing materials, visual inspections, and sample results. Sampling decisions for the Troy OU7 are based on sampling protocols and limited sampling results from the work done in Libby. Cleanup decisions will be based on the presence of and the concentrations of LA contaminated materials. Currently, EPA contract laboratories are achieving analytical sensitivities of 500 s/cm^2 for dust by transmission electron microscopy and 0.2 percent for soil by polarized light microscopy – VE.

TABLE 3-1 (continued)

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY OPERABLE UNIT

STEP 5: Develop Decision Rules (Continued)
All Troy samples will be analyzed through EPA's contract laboratories and thus these sensitivities will be met for Troy samples. Currently these sensitivities are the best achievable when considering both cost and technical feasibility. • Visually determine if VCI is present or absent in attics of all buildings. • If VCI is visible in a building attic, then collect dust samples from the living spaces to evaluate the presence and concentrations of LA. • If VCI is not visible in an attic, then collect dust samples from the living spaces to evaluate the presence and concentrations of LA from any secondary indoor source of LA. • If vermiculite is visible in the living space of a building interior, then collect dust samples to evaluate the presence and concentrations of LA in the area. • If vermiculite is not visible in the living space of a building interior, then collect dust samples to evaluate the presence and concentrations of LA from any secondary indoor source of LA. • Visually determine if vermiculite or LA is present in exterior use areas. • Collect multi-aliquot composite soil samples from specific use areas to evaluate the presence and concentrations of LA. • If the property contains a yard and large open space, then subdivide these areas by common use, limited use, or non-use areas and collect a multi-aliquot composite soil sample from the common use and limited use areas to evaluate the presence and concentrations of LA. No samples will be collected from non-use areas. Figure 3-1 shows the steps used to inspect and sample buildings and exterior property in the Troy OU7. Figure 3-2 provides some typical outdoor soil sampling designs for exterior use areas.
STEP 6: Specify Tolerable Limits on Decision Errors
• Sampling and measurement error are associated with environmental data collection and may lead to decision errors. Sampling error occurs when the sample is not representative of the true site conditions. Measurement error occurs because of random and systematic errors associated with sample collection, handling, preparation, analysis, data reduction, and data handling. Decision errors are controlled by adopting a scientific approach that uses hypothesis testing to minimize the potential for error. • There are two types of decision error: false negative error and false positive error. A false negative decision error occurs when the null hypothesis is rejected although it is true. The consequences of a false negative error would be that VCI or LA-contaminated dust or soil at a Troy property is not identified for further evaluation and possible remediation. A false positive decision error occurs when the null hypothesis is not rejected although it is false. The consequences of a false positive error are that unnecessary resources are expended to evaluate media that are not truly contaminated or do not pose a concern.

TABLE 3-1 (continued)

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY PROPERTIES

STEP 6: Specify Tolerable Limits on Decision Errors (Continued)
Property-specific sampling objectives and the sampling design combine to limit the potential error introduced by the random distribution of vermiculite and LA-contaminant soil. Tolerable limits on sampling and decision errors cannot be precisely defined; however, the decision errors will be minimized by inspecting and sampling all properties in the Troy OU7. Sampling error will be reduced by the sampling design. Future decision errors based on analytical data will be minimized by the use of standard EPA-approved and Libby-specific analytical methods and other pertinent information available from the Libby Asbestos Superfund Site.
STEP 7: Optimize the Sampling Design
• All properties in the Troy OU7 will be uniquely defined in the work plan, and their locations will be identified using existing Lincoln County records, cadastral databases, and low-level aerial photographs. The number of Troy properties to be investigated will be approximately 1,198. Some houses and buildings likely are on multiple platted properties. • Each platted property will be assigned an individual address number. All subsequent information collected for the property will be associated with the address number. Information that will collected will include the interview results, inspection results, and interior and exterior sampling data. • Dust and soil samples will be collected using similar methods and standardized procedures that have been employed for the Libby OU4, updated when necessary based on current state of knowledge. With more than 4,000 Libby properties sampled since 2001, the methods have been defined (CDM 2002; CDM 2003a; CDM 2003b; EPA 2003a). A Troy OU7 specific soil sampling and visual estimation of vermiculite guidance is attached in Appendix B. • Field QA/QC procedures will be implemented and will include equipment and personnel decontamination, QC samples, field documentation, and sample chain of custody. Scientifically valid and legally defensible data will be supported by collection of dust and soil field blanks and other QC samples at a frequency necessary to assess potential cross contamination from equipment and sample integrity during collection. • The information for each sample and each property inspected within the Troy OU7 will be entered in a PDA. The information will include the data collected on the field sample data sheets used in Libby. The PDA data will be downloaded into the Troy OU7 database nightly and transmitted to EPA nightly using EPA's Scribe.net software. The entire Troy OU7 database will be uploaded to the existing Libby V2 database at the conclusion of the field season.

TABLE 3-1 (continued)

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY PROPERTIES

STEP 7: Optimize the Sampling Design (Continued)
• Dust and soil samples collected at each Troy property will be uniquely labeled, and sampling information will be recorded into the PDA. The PDA sample records, along with the samples, will be transferred to a Tetra Tech sample data coordinator, who will verify completeness and accuracy of the records. The soil and dust samples will be transferred under chain-of-custody procedures to the ESAT field laboratory. • Montana DEQ and its contractor, Tetra Tech, will work closely with ESAT and EPA to ensure that sample integrity is maintained throughout and that data quality is adequate to meet project objectives. • ESAT will transfer sample preparation information to EPA and prepare the samples for analysis. • Figure 3-3 provides a schematic diagram of the TAPE process used by Tetra Tech to organize, conduct the property evaluations and sampling, and provide samples and electronic information to EPA.

Notes:

EPA U.S. Environmental Protection Agency
LA Libby amphibole
OU Operable Unit
PDA Portable digital assistant
VCI Vermiculite-containing insulation
% Percent

Figure 3-1 TAPE Inputs

Figure 3-2 TAPE Outdoor Soil Sampling Design

Figure 3-3 TAPE Inspection and Sampling Process Diagram

The DQOs will be used to design the TAPE project so that the sampling and analysis are appropriate to provide information to EPA regarding the properties with vermiculite-containing insulation (VCI) and other potential sources of Libby amphibole contamination (vermiculite, building materials, or soil) within the Troy OU7.

4.0 FIELD PROCEDURES

This section of the TAPE work plan describes the field activities to be implemented for the TAPE inspection and sampling project and includes the following tasks:

- Mobilizing and demobilizing
- Obtaining access agreements
- Scheduling inspections with property owners
- Conducting verbal interviews
- Conducting property inspections – indoor, attic, outbuildings, exterior use areas (using the PDA)
- Collecting indoor dust samples (recorded in the PDA)
- Collecting outdoor soil samples (recorded in the PDA)
- Collecting QA/QC samples
- Decontaminating equipment and personnel
- Containing and disposing of investigation-derived waste

Troy project-specific guidance and standard operating procedures (SOP), with current amendments, are provided in Appendix B and are referenced throughout this section of the TAPE work plan. As appropriate, Tetra Tech has developed project-specific guidance for Troy which is based largely on guidance developed specifically for the Libby Asbestos Superfund Site. The Tetra Tech project-specific guidance and the Libby-specific guidance documents that were used to generate the Troy guidance are listed below and copies are provided in Appendix B.

- Tetra Tech — PDA Completion Guidance, Version 01
- Tetra Tech — TAPE Soil Sampling and Visual Estimation of Vermiculite Guidance, Version 01
- CDM-Libby-03 — Libby guidance for completing the FSDSs
- CDM-Libby-04 — Completion of Information Field Form
- CDM-Libby-05 — Site Specific Standard Operating Procedure for Soil Sample Collection

Health and safety protocols and requirements will apply to all field activities and are summarized below. Information on quality control is provided in Sections 5.0 and 7.0 of this TAPE work plan.

4.1 HEALTH AND SAFETY PROCEDURES

The TAPE HASP (Appendix A) and Tetra Tech's corporate health and safety program plan will apply to all field activities undertaken as part of this project. All field staff conducting inspection and sampling activities will be required to:

1. Hold a current OSHA hazardous waste operations (HAZWOPER) 40-hour training certification and up-to-date 8-hour refreshers, as required under 29 CFR 1910.120;
2. Have medical clearance to work wearing a full-face or half-face air purifying respirator; and
3. Be quantitatively fit-tested for the specific project respirator within the 12 months prior to the field activities.

The TAPE HASP in Appendix A provides detailed health and safety protocols and requirements, including directions for when to use PPE, such as respirators. All attic entries will be conducted in modified level C PPE that will include a half-face or full-face air purifying respirator with HEPA cartridges. Other property inspection activities, including dust sampling and soil sampling, will be conducted in modified level D PPE. Mr. Bryan Erickson will be the Tetra Tech site safety officer for the field activities (see Table 2-1 of this TAPE work plan).

Work that results in potential employee exposure to airborne asbestos above the prescribed permissible exposure limit (PEL) or short-term exposure limit (STEL) requires an exposure assessment regulated under the OSHA reference method 29 CFR Part 1910.1001. The determinations of employee exposure will be made from breathing zone air samples representative of the 8-hour time-weighted average (TWA) and 30-minute STEL for each employee work category. The PEL is 0.1 fibers per cubic centimeter (f/cc) for the 8-hour TWA, and the STEL is 1.0 f/cc over a 30-minute period as set forth in 29 CFR Part 1910.1001 (j)(2)(iii). Negative exposure assessments for the field teams will be performed during the initial stage of the TAPE and as necessary during the process, as described in the HASP and at the direction of the site safety officer. Stationary samples will also be collected at the DEQ Troy Information Center, the on-site soil preparation laboratory, and at other properties to document background airborne fiber levels.

4.2 SITE ACCESS AND LOGISTICS

Section 4.2 provides information about community relations, logistics and schedules, and site access agreements.

4.2.1 Community Relations and Information Centers

Tetra Tech will coordinate with DEQ to ensure that sufficient public outreach (including public meetings, fact sheets, newspaper articles and notices, and radio announcements) is completed before and during implementation of the TAPE. Tetra Tech will provide personnel to attend public meetings in Troy and Libby and will help prepare presentation materials, at DEQ's request. Public outreach and information on the purpose and nature of the TAPE and its role in the overall investigations and cleanup at Troy and Libby are essential to its success.

Tetra Tech and DEQ will provide public information at the DEQ Troy Information Center at 303 N. Third St. and the sampling teams will also have some public information to hand out during the inspections. The office is centrally located across from the Troy Senior Center, next door to the public library, and on the same street as the Troy City Hall. The DEQ Troy Information Center will also serve as the Tetra Tech field office and will be the TAPE logistical center for obtaining property access agreements, scheduling field activities, returning samples and field forms at the end of the day, and transferring sample custody from Tetra Tech to the ESAT sample preparation laboratory. The DEQ Troy Information Center will also provide a physical location and venue for people in Troy to provide and obtain information about the project. The DEQ Troy Information Center will also have telephones and answering machines for contacting project personnel when the office is not staffed and after regular hours (Monday through Friday 8:00 am to 5:00 pm). The address and phone number for the DEQ Troy Information Center will be advertised and posted at the location. DEQ will establish a repository for general and Troy-specific information at the DEQ Troy Information Center, located at 303 N. Third Street. Tetra Tech and DEQ will continue to provide updated information throughout the field sampling activities.

The existing EPA Information Center at 501 Mineral Avenue in Libby will also be an information resource for Troy residents, providing access to major project documents. Information about the Libby Asbestos Superfund Site is also available on the Internet at http://www.epa.gov/region8/superfund/libby.html. DEQ will maintain updated information regarding Troy on this webpage.

Section 2.0 of this work plan discusses the roles and responsibilities of the DEQ and Tetra Tech in community relations.

4.2.2 Logistics and Schedule

DEQ and Tetra Tech will staff the DEQ Troy Information Center in Troy for the duration of TAPE field activities. Tetra Tech and DEQ will identify and provide all necessary personnel, sampling equipment, PPE, and project materials for implementing this work plan. All Tetra Tech field personnel will be trained not only in specific tasks but also on the overall objectives of the TAPE. This training will facilitate TAPE implementation and allow for effective communication with the public and other team members.

Tetra Tech personnel will include the TAPE project manager, who will oversee all project activities and logistics and will ensure that the lines of communication are maintained to resolve any issues or concerns that may arise during the field efforts. The Tetra Tech project manager will reside in Helena but will be at the project site in Troy for about 25 percent of the field activities. The TAPE field team leader will be based out of Troy and will be responsible for obtaining site access agreements, assisting with public outreach, scheduling daily field activities, and providing quality control and oversight of the five TAPE field teams. Tetra Tech will also provide a community involvement coordinator (CIC) and a field sample coordinator to reside in Troy and assist the project manager and field team leader with daily project tasks. The Tetra Tech field sample coordinator will have primary responsibility for checking and cataloging soil and dust samples at the end of each day and for working closely with the ESAT Troy sample coordinator to ensure that complete, adequate, and secure sample information is collected and transferred to EPA. The detailed responsibilities for these Tetra Tech project personnel are further discussed in Section 5.5.

Tetra Tech will provide five two-person TAPE field teams stationed in Troy for the duration of the field effort. Some substitution and rotation of field staff on and off the TAPE project are expected, but the field staff will work a minimum of two weeks before substitutions occur. The Tetra Tech field team leader (Mr. Stockwell) will accompany the field teams on a rotational basis to ensure and verify that the teams are conducting the TAPE activities as described and outlined in this work plan. The Tetra Tech field teams may conduct limited TAPE inspections on Saturday to better accommodate the schedules of Troy property owners. Both members of a field team will be HAZWOPER certified and be trained to properly handle the health and safety protocols for this project. Additionally, at least one member per field team will hold a current AHERA asbestos inspector training certificate. All field team members will complete on-site training on the TAPE, sample collection, community relations, and health and safety.

On average, a Tetra Tech field team will complete one to two TAPE inspections per day, depending on the complexity of the properties inspected. With five field teams, Tetra Tech should complete about 70% of the total number of inspections (1,198) in the 2007 field season. The remaining 30% will be completed in the 2008 field season.

4.2.2.1 Communications

Field team members will be provided with multi-channel radios for the duration of field activities. Contact information, including emergency numbers, for all field teams and for TAPE project management personnel in Helena, Montana, will be stored in the DEQ Troy Information Center. In addition, the Montana DEQ TAPE project officer (Ms. Catherine LeCours), ESAT Troy sample coordinator, and EPA Libby Asbestos Superfund Site personnel will be provided with contact information for ready access to the Tetra Tech field teams.

4.2.2.2 Equipment

Appendix C details equipment and supplies Tetra Tech identified as necessary for the TAPE field activities described in this work plan. The Tetra Tech field team will inspect the equipment and supplies prior to field use to ensure they are in good condition and free of defects.

4.2.2.3 Pre-Field Activities

Before field crews mobilize to Troy for the TAPE field inspections, Tetra Tech will prepare detailed property maps that identify individual Troy properties. Property boundary and other details will be gathered from public databases (cadastral) and projected onto high-quality, high-resolution air photographs. Individual Troy property maps consisting of the parcel boundaries on a white background will be used during the TAPE field inspections as the template for the site sketches and the approximate locations of the exterior use areas and soil samples collected at each property will be recorded. These property maps will be field checked and may be revised as necessary during the inspections. The information from the TAPE inspection and sampling activities will be recorded in a PDA. The forms programmed into the PDA will be prepopulated with the parcel information before the field teams leave the field office. Tentative inspection and sampling schedules may be based on a block-by-block TAPE inspection pattern. The TAPE inspection schedule will be refined as Tetra Tech schedules the inspections at times and dates convenient to the property owners.

4.2.2.4 Field Team Organization

Five field teams of two people per team will conduct the TAPE inspections and sampling. On average, 10 properties will be inspected and sampled each day. At the start of each day, the field teams will meet at the DEQ Troy Information Center/Tetra Tech field office for daily safety and organizational briefings (see Section 4.1 and Appendix A HASP).

Before the morning briefing, the Tetra Tech field team leader with assistance from the CIC and field sample coordinator will have prepared the PDA and packet for each field team to include specific information for each property to be inspected and sampled that day. Each PDA and packet will include:

- Confirmation that the office has a signed access agreement or blank access agreement if occupant provided prior verbal agreement,
- Details of the scheduled inspection date and time, and the name and telephone number of the property owner or the person who will be present for inspection and sampling, if different than the property owner,
- A property-specific verbal interview form,
- A PDA prepopulated with property-specific data,
- Preprinted property-specific, building, sample point, and sample identification labels
- Two copies of the property parcel maps.
- Graph paper for field sketch documentations.

Each field team will have a numbered logbook specific for the Troy project and will be responsible for any additional information included in the logbook. Additional TAPE inspection and sampling supplies (as described in Appendix C, list of supplies) will be kept at the DEQ Troy Information Center/Tetra Tech field office for use by the field teams. The daily briefings will be used to conduct daily health and safety meetings, coordinate daily property inspections, calibrate sampling equipment, and collect supplies. The daily briefing will include a review of any issues or problems that arose the previous day, and will provide an opportunity for field team members to ask questions and share lessons learned. At the end of each day, field teams will return to the field office to deliver samples and paperwork to the Tetra Tech field data coordinator, download information from the PDAs, download digital cameras, charge rechargeable equipment, and store field equipment for the evening. Section 6.0 of this work plan contains additional logistical details on TAPE data management.

4.2.3 Access Agreements

Approximately one month before TAPE field activities begin, Tetra Tech will assist DEQ with mailing access agreements to every Troy property owner where the property has been identified for inspection and sampling. A cover letter will contain information from DEQ on the proposed sampling and contact information for DEQ Troy Information Center, DEQ, EPA, and the Libby Information Center. The packet will also contain two copies of an access agreement form and a postage-paid envelope for the property owners to return a completed access agreement. The other copy of the access agreement is for the property owner's records. The cover letter will explain the need for the signed access agreement and encourage any property owners who have questions or concerns about the process to contact the designated parties. An example cover letter and access agreement is provided in Appendix D. A separate access agreement will be required for each parcel of land.

The Tetra Tech project manager, Troy field sample coordinator, and field team leader will manage information mailed in from the Troy property owners, including signed access agreements. All access agreements will be scanned and downloaded into the Troy project Scribe database where they will become part of the electronic record for the property. A Tetra Tech field team person will follow up with properties where no response has been received. Follow up contacts (in person or by telephone) will explain the purpose of the TAPE, describe the inspection and sampling process, and answer any pertinent questions. Property owners may provide verbal approval and schedule an inspection; therefore, field teams may obtain a signed access agreement immediately prior to a scheduled inspection.

If property owners are not available during the reconnaissance, the field team will revisit each location at least three times, and the field team leader (or designee) will continue to follow up with personal visits and by telephone. After repeated attempts to contact the property owner by the field teams and the field team leader, Tetra Tech will repeat the mailing with a letter describing the attempts made to contact the property owner.

When Tetra Tech has received either verbal approval or a completed and signed access agreement either by mail or from a field team, Tetra Tech will contact the property owner by telephone to schedule a TAPE inspection and sampling visit.

Tetra Tech will make reasonable efforts to find a TAPE inspection and sampling date and time that are convenient for the property owner. TAPE inspections and sampling schedules will include evenings (daylight hours only) and Saturdays, as needed based on the requests of property owners. If property owners respond to the access agreement favorably, but a property is currently uninhabited (for example, it is only seasonally occupied or is currently for sale, or no buildings are present on the property), Tetra Tech will attempt to inspect and sample the property with a designee of the property owner. Properties will not be exempted from inspection or sampling on the basis that they are currently uninhabited, however.

Tetra Tech will not advise property owners of the likely nature of removals at their properties or estimated removal dates during the TAPE scheduling phase, the personal interviews, or the TAPE inspections and sampling. Property owners will be advised that DEQ and EPA will determine removals and schedules after analytical results have been received and evaluated.

Some Troy property owners may be non-responsive or unwilling to sign an access agreement, even when Tetra Tech has attempted to contact them by all reasonable means (telephone, visit to the property, and repeated mailings) to obtain permission for a TAPE inspection and sampling. Tetra Tech will provide DEQ with a list of all Troy properties where the property owner could not be contacted or refused to sign an access agreement at the conclusion of TAPE field activities.

4.3 VERBAL INTERVIEW

The Troy property visit by the TAPE field team will commence with a verbal interview by the field team with the property owner to acquire background information about the property. The field team will interview the property owner using the questions provided on the interview form (Appendix E). Interview topics will include the known or suspected use of VCI or other Libby amphibole-containing building materials in the house or outbuildings and possible introduction of other sources of Libby amphibole within or near the property (including garden and landscaped areas and neighboring properties). A unique property identification number (AD-XXXXXX) will be assigned to each individual property that is inspected. Identification numbers for Troy OU7 will begin at 500001 and then go up so they will not overlap with any numbers used at Libby OU4.

All buildings encountered during the TAPE inspections will be classified as either a primary structure (habitable building, for example, a house, apartment, or main commercial space); or a secondary structure (non-habitable building, such as garages, shops, sheds, barns, or dog houses). The verbal interview will address all primary and secondary buildings and exterior use areas located on a Troy property.

4.4 BUILDING INSPECTION, SAMPLE COLLECTION, AND RECORDING PROCEDURES

This section describes the inspection, sampling, and recording to be completed for each TAPE inspection.

4.4.1 Indoor Inspection

The two-person field team will visually inspect each building for the presence of Libby amphibole contamination. One team member will access and inspect the attic (if safe, present, and reasonably accessible) and will inspect additional areas where VCI may be exposed in living spaces (crawlspaces, closets, and any wall openings). Tetra Tech anticipates that attic areas will be categorized in various levels of finishing, ranging from completely unfinished spaces with exposed ceiling trusses and framing, to partially finished with some "flooring" provided, to fully finished "livable spaces." The Tetra Tech field team members will determine whether to enter the attics based on safety related decisions. Team members will only access unfinished attics areas with their head and torso and will remain standing on ladders. Team members may enter partially or fully finished attics to conduct more extensive investigations, if deemed safe. If VCI is observed, the field team member will estimate the quantity based on field measurements or visual estimation, with field measurements (length, width, and height of item) collected wherever possible.

The second team member will document results, including estimated quantities of VCI and other insulation (if present), on the PDA and will record additional pertinent information in the field logbook. As much as is possible in a non-destructive manner, the visual inspection will include checking under other types of insulation (such as blown-in or fiberglass insulation) for VCI. Visual inspections will not involve opening up walls or ductwork to inspect for VCI within the building wall cavities, but will include removal of a representative sample of electrical switch plates to inspect wall interiors. Furthermore, it will include inspecting ductwork in accessible, unfinished areas of the building for VCI. In particular, the field team will note whether utility conduits (including heat/cooling vents) run from the attic to the living space. Visual inspections will not include inspecting the roof.

Attics will be considered reasonably accessible if they can be reached by stairs, hanging stairs, or a non-conductive stepladder (either from the interior or exterior of the building). Attics will be inspected in a manner that, in the judgment of the field team, is not likely to release additional VCI into the living space (exterior access is preferable). The field team will compare exterior roof lines and interior ceiling heights with attic interiors in an effort to identify isolated attic areas that may exist between the roof and the main attic, or between the attic and the interior ceilings. If isolated attics are found, they will be inspected if possible, and barriers between attic areas and access points will be documented in the PDA. Whenever possible, attic inspections will also involve inspection of kneewalls (areas where the pitch of the roofline meets the walls). Kneewalls may be used for storage or to improve the finished look of an attic. Kneewalls will be accessed wherever possible, as these areas may provide additional information on construction material. For example, kneewalls may have unfinished floors compared with the finished floors in the rest of the attic. If trusses or bracing posts are present in the attic that may pose an obstacle to potential cleanup, these items will be briefly described in the inspection form.

As detailed in the HASP, decontamination zones will be established during the TAPE project, such as at the base of ladders used to access attic spaces or outside of crawl space entrances. These areas will be covered with two layers of polyethylene sheeting during sampling in the attic or crawl space. After personal and equipment decontamination are complete and polyethylene sheeting removed, decontamination areas will be cleaned of debris and residue using appropriate HEPA vacuuming or wet cleaning procedures. Visitors, including building occupants, will not be permitted to enter the decontamination zone without proper qualifications and authorization.

If potted plants are located inside the primary building, the field teams will note whether vermiculite-containing potting soil is present, as this type of soil could affect results of dust sampling.

As described in the HASP (Appendix A), the field team will not be required to access any attics, crawl spaces, or living areas if there is an unacceptable safety hazard, including biological hazards. The field team will not inspect Troy properties for non-VCI and non-Libby amphibole asbestos. However, damaged or friable suspect asbestos-containing materials that are observed in the inspection will be noted in the PDAs and field notebook and a photograph will be taken. This information may be of use in interpreting sampling results and planning potential remediation efforts.

The field team may choose to photo-document specific conditions in the building during the TAPE inspection for future reference. The property owner will be asked for permission before any photographs are taken.

If new or existing damage is present in the home that may result in the exposure of the residents to vermiculite the field team may install temporary barriers to prevent additional vermiculite from entering the living space. Temporary barriers may include plastic sheeting taped over openings, caulking small cracks, or other minor repairs.

TAPE inspections will be primarily documented in the PDAs (Appendix E) with backup in the field logbooks. Pertinent details will include, but are not limited to, identifying the primary and secondary buildings, defining attic spaces, and detailed property sketches.

As described in Section 4.3, buildings on a property will be classified as primary or secondary. Every primary and secondary building will be subject to a TAPE inspection, the data will be entered into the PDA, and samples collected.

4.4.1.1 Record Building Locations with GPS

As part of the TAPE inspection, the location of each primary and secondary building on the property will be recorded using the Trimble GeoXT PDA. The Global Position System (GPS) location will be recorded at the primary entrance to each building. Coordinates will be saved in the PDA with a unique identification number that starts with the notation "BD-XXXXXX," where "BD" indicates a building location, and in the field logbook. BD numbers for the Troy OU7 will begin at 500001 and then go up so they will not overlap with Libby OU4. The sample coordinator will download the data each day and assign the next day's set of unique site identification numbers.

4.4.2 Indoor Dust Sampling

Dust samples will be collected using microvacuum (microvac) sampling techniques in all primary buildings, regardless of whether VCI or other Libby amphibole-containing building materials are observed. Asbestos is not visible to the unaided eye and not all sources (historical or current) may be identified during visual inspection. Therefore, dust samples will be collected at all properties. Dust samples will be collected following the procedures provided in the most recent version of American Society for Testing and Materials (ASTM) *Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Concentrations* (D 5755), as amended for the Libby Asbestos Superfund Site. A copy of the most recent standard ASTM method is provided in Appendix B, with site-specific applications described below (ASTM 2003).

The decision to use microvac sampling, rather than wipe sampling, for the TAPE inspection and sampling was based primarily on the need to collect data that are consistent with data collected for Libby OU4. EPA, and its contractor CDM, have used microvac sampling methods to collect the indoor dust samples at Libby OU4. Microvac sampling methods are assumed to collect samples that more accurately measure releasable asbestos fibers when compared with wipe samples. Each indoor dust sample will be composed of a 30-point composite sample, as described in the above-mentioned ASTM standard (ASTM 2003), as amended.

4.4.2.1 Select Sampling Locations

The TAPE field team will select sample locations based on the team's visual inspection of the buildings and estimation of where contaminated dust is most likely to be found. The number and locations of dust samples will be selected as described below.

Primary and Secondary Buildings

Dust samples will be collected in every primary and secondary building regardless of whether Libby amphibole contamination was observed during the visual inspection.

- One dust sample will be collected on each level of the building's living space (including finished basements). One 30-point composite sample will be collected from accessible horizontal surfaces (for example, carpet, flooring, windowsill, shelving, and cabinets). The TAPE field team will select the surface or surfaces based on factors including proximity to observed VCI and dust accumulation. (Preference will be given to surfaces with higher dust accumulation that are closer to observed VCI.)
- One 30-point composite sample will be collected from each unfinished basement, if present. This sample will be collected from both walkways and horizontal surfaces inside the basement, with specific aliquots selected at the discretion of the TAPE field team.
- One 30-point composite sample will be collected from each secondary building, including a garage or shop, if present. This sample will be collected from both high-traffic walkways and horizontal surfaces inside the building, with specific aliquots selected at the discretion of the TAPE field team.
- No dust samples will be collected in attics or crawlspaces with visible Libby amphibole contamination. Based on extensive sampling and analytical results from Libby OU4, VCI found in attics and crawlspaces is assumed to be contaminated with Libby amphibole fibers (EPA 2003b).
- The field team may choose to collect additional, targeted dust samples if migrating VCI or localized areas of contamination are observed in the living space of a primary structure. These data would be used to design small scale vermiculite removal actions, if necessary.

4.4.2.2 Dust Sample Collection

Collecting a microvac dust sample involves vacuuming dust from a surface and drawing the sample through a filter designed to capture particulates larger than 0.8 micrometers (µm). The ASTM method D5755-03, as amended for the Libby Asbestos Superfund Site, provides the procedural details for properly collecting a microvac dust sample (Appendix B, ASTM 2003).

The microvac device will consist of a battery-operated low-volume sampling pump connected to a 25-millimeter (mm) vacuum dust sampler cassette. The cassettes will contain a 0.80-μm mixed cellulose ester filter. A 6.35-mm diameter plastic tubing will be used to connect the cassette to the pump. A 25- to 37.5-mm length of 6.35-mm diameter tubing will be used to create a "nozzle" on the cassette for sampling. The nozzle tubing will be cut at the sampling end at an approximate 45-degree angle.

The air sampling pumps will be calibrated prior to and following sample collection using a secondary standard rotometer. The flow rate used for sampling will be approximately 2 liters per minute, which provides an approximate air velocity of 100 centimeters per second through the 6.35-mm diameter tubing. Each field team will be equipped with a secondary standard rotometer to ensure proper flow rates are maintained. All secondary standard rotometers will be calibrated by a primary standard device such as a Gilibrator or Buck Calibrator. Each field team will collect one field blank dust sample per day. All dust sample blanks will be archived and one sample blank will be randomly selected from the total number of blanks collected each week and analyzed for QA/QC purposes.

The sampling area for each dust sample point (aliquot) will be 100 square centimeters (cm^2) delineated using a fixed template provided with the sampling cassettes. The aliquot sample will be collected by activating the pump and passing the angled nozzle across the delineated surface for a minimum of two orthogonal passes and 30 seconds without scraping or abrading the surface being sampled. After approximately 30 seconds at the aliquot sample point, the device will be moved to the next point until all 30 aliquot points have been collected. The field team will use a stopwatch to record both the 30-second intervals and the total composite sample time.

Each indoor dust sample will contain 30 sample aliquots; that is, 30 separate 100 cm^2 surfaces will be vacuumed using one cassette. The cassette will therefore contain dust from a total 3,000 cm^2 surface area and a total of approximately 15 minutes of sampling time. To collect aliquots, the pump will be turned off and the sampling device moved to the next sample point. Once the next aliquot area has been delineated using a template, the pump will be turned on and the next 100 cm^2 surface area will be vacuumed. When all sample aliquots have been collected, the sampling device will be turned upside down so that any loose dust falls into the cassette. The exterior of the cassette and nozzle will be wiped clean with a wet towel (wet wipe). The cassette will be detached from the pump, the cap returned to the cassette, and the cassette and the nozzle will be placed in a re-closable plastic bag for shipment to the laboratory (see Appendix B for details). The nozzle will be included in the shipment because significant quantities of dust can remain in the nozzle. The sample will be labeled using the pre-printed sample labels and will be wrapped for return to the Tetra Tech field office. Dust samples will be labeled with a unique sample identification number "TT-XXXXX" where "TT" indicates a "Troy TAPE" sample. Chain-of-custody procedures will be followed as described in Section 5.5.2.

Indoor dust sample point locations will be described and recorded in the TAPE field logbook and in the PDA and may be photographed and identified on the property sketch at the discretion of the field team.

4.4.2.3 Indoor Soil Sample Collection

Interior Surface Zones include all soil surfaces within the interior of buildings, such as garages, pump houses, sheds, and building crawlspaces. Soil will be sampled from interior surface zones regardless of the results of the visual inspection. Soil sampling will include the following steps:

- Identify sampling locations
- Collect samples and assess the sample aliquots for visible vermiculite
- Record locations on Troy property map
- Record entrance of the building locations using GPS

TAPE interior surface zone soil samples will be collected as 30-point composites with each subsample being collected from zero to three inches in depth. The maximum area for each sample will be 1,000 square feet. Areas larger than 1,000 square feet will be subdivided and more than one sample (of 30 subsamples each) will be collected. The soil samples will be collected and visually assessed using the procedures defined in Section 4.4.4.2.

4.4.3 Outdoor Inspection

All areas of the Troy properties that are not covered with buildings will be inspected for vermiculite product in soil and surface materials. The areas of the Troy properties that are not covered by buildings will be grouped into four general types: (1) specific use area, (2) common use area, (3) limited use area, and (4) non-use area. Figure 3-2 provides typical outdoor soil sampling designs for these four general types of outdoor areas. The definition of each land use area is presented below.

Specific Use Area – Discrete exterior parcels on a property with a designated specific use. Due to the nature of activities typically carried out in specific use areas, residents may be especially vulnerable to exposures when Libby amphibole-contaminated soil becomes airborne. Specific use areas may be bare or covered with varying amounts of vegetation. Specific use areas previously identified at the Libby Asbestos Superfund Site and likely to occur at the Troy site include:

- Flower pot
- Flowerbed
- Former flowerbed
- Garden
- Former garden
- Stockpile
- Play area
- Dog pen

Common Use Area – Exterior parcels on a property with varied or generic use. Common use areas may be bare or covered with varying amounts of vegetation. Common use areas previously identified at the Libby Asbestos Superfund Site and likely to occur at the Troy site include:

- Driveway
- Parking lot
- Road
- Walkway
- Yard (front, back, side, or other areas)

Limited Use Area – Exterior parcels on a property that are accessed, utilized, and maintained on a very limited basis. Limited use areas may be bare or covered with varying amounts of vegetation. Limited use areas likely to occur at the Troy site include:

- Pasture/field
- Maintained/mowed fields
- Overgrown areas (with trails/footpaths, or between specific use areas/common use areas)

Non-use Area – Exterior parcels on a property with no current use (for example, areas that are un-maintained and not accessed). Non-use areas may be bare or covered with varying amounts of vegetation. Non-use areas likely to occur at the Troy site include:

- Wooded lot
- Un-maintained fields

The property sketch will show the location of buildings, pavement, and exterior use areas and fences, large trees, or other potential obstructions to potential future remediation. Properties that do not have yards, such as commercial properties, will be described as such in the PDA and in the field logbooks; outdoor areas such as paved parking or driveways will still be inspected. As best identified by the property owner, property boundary lines will also be noted in the PDA and shown on the property sketch.

It will not be necessary to delineate the vertical extent of contamination because the default excavation depth for remediation of specific use areas is 18 inches below ground surface (EPA 2003b). Similarly, the default excavation depth for remediation of general yard areas, open space, and driveways is 12 inches below ground surface (EPA 2003b).

The field team may elect to photo-document specific conditions on the property for future reference. The property owner will be asked for permission before photographs are taken.

4.4.4 Outdoor Soil Sampling

After the visual inspection of the property has been conducted, the TAPE field team will collect soil samples from all exterior use areas following the procedures described below and in the Tetra Tech's project-specific guidance (Appendix B). Soil will be sampled regardless of the results of the visual inspection. Soil sampling will include the following steps:

- Identify sampling locations
- Collect samples and assess the sample aliquots for visible vermiculite
- Record locations on Troy property map
- Record sample locations using GPS

4.4.4.1 Identify Sampling Locations

TAPE soil samples will be collected as 30-point composites with composite subsamples taken from similar use areas. Typical designs for outdoor soil sampling are shown graphically on Figure 3-2. It can be assumed that Libby amphibole sources would have been distributed across an area, for example by tilling into a yard or garden. A minimum of one 30-point composite soil sample will be collected at each Troy property, unless the property has no soil-covered areas (for example, all outdoor areas are paved). A 30-point composite will also be collected from each exterior use area. Table 4-1 lists the maximum allowable areas for each exterior use area. If the area of an exterior use area is greater than the maximum allowable size, the exterior use area will be subdivided and multiple soil samples will be collected and visually examined. The Tetra Tech TAPE field team will use professional judgment to select the appropriate numbers of soil samples to collect at each property. In addition, the TAPE field team will collect all soil samples with the minimum amount of disturbance to the surface. Sod will be carefully removed and immediately replaced after sampling and care will be taken to collect soil samples without disturbing growing flowers and vegetables. To ensure consistency, all TAPE field teams will be provided the same training and guidelines, and training will include “brainstorming” potential property scenarios and discussing proposed sampling approaches.

TABLE 4-1
SAMPLING AREA AND DEPTH

Land Use Area	Maximum Area (Square Feet)	Sampling Depth (Inches)
Special Use Area	1,000	0 to 6
Common Use Areas	2,500	0 to 3
Limited Use Area	2,500	0 to 3
Non-Use Area	Not sampled	Not sampled
Interior Surface Zone	1,000	0 to 3

4.4.4.2 Collect Soil Samples

Soil samples will be collected from exterior use areas at properties in the Troy OU7. Figure 3-2 provides typical outdoor soil sampling designs for these types of outdoor areas.

A typical Troy yard sample will be composed of a 30-point composite soil sample collected from the 0 to 3 inch depth. As shown in Figure 3-2, the 30 individual sample points that will make up each composite sample will be located within a similar land use area, such as the back yard, front yard, or side yard. A minimum of one 30-point composite sample will be collected from each Troy OU7 property with a yard. Additional 30-point composite samples will be collected when the yards are larger than 2,500 square feet.

A typical open space sample will also be composed of a 30-point composite soil sample, as shown on Figure 3-2, collected from the 0 to 3 inch depth. Typical spacings for the individual 30-point locations are shown as approximately 10 feet, but this distance can be modified to best fit the land use area. Additional 30-point composite samples will be collected for each open space area of approximately 2,500 square feet. The Tetra Tech field team will use professional judgment to select the appropriate number and type of soil samples to collect for each yard and open space. Not all open spaces may be sampled, depending on current and historical uses. To ensure consistency, all field teams will be provided the same training and guidelines, and training will include “brainstorming” potential property scenarios and discussing proposed sampling approaches.

Specific use areas in Troy include outdoor gardens, former gardens, flowerbeds, play areas, gravel or dirt driveways, and other areas with potentially greater exposure or greater use of vermiculite amendments. Thirty-point composite soil samples will be collected from the 0 to 6 inch depth interval in specific use areas. Figure 3-2 presents typical layouts for a garden plot, flower bed, and undefined areas. Typical sample spacing shown on Figure 3-2 is for 5 feet separation, but the distance can be modified to best fit the specific use area. The TAPE field teams will be provided training and guidelines for consistent sampling of specific use areas.

Stainless steel scoops will be used to collect approximately 80 grams of soil sample from the 0 to 3 inch or 0 to 6 inch soil interval at each subsample location for a total of approximately 2.5 kg of soil. If a small metal shovel is required to assist with sampling to 6 inches, the shovel will be thoroughly cleaned and decontaminated after each sample using procedures outlined in Section 5.1. Each subsample will be examined for the presence of visible vermiculite. The amount of vermiculite will be categorized as none, low, or high using the procedures defined in the TAPE soil sampling guidance and visual estimate of vermiculite content, Version 01 (Appendix B). Subsamples will then be placed into a stainless steel bowl and mixed. After the sample has been homogenized, approximately 2.5 kg of soil will be placed in one re-closable plastic bag and mixed. During sample collection and mixing, the field team will attempt to shield the soil samples from the wind to avoid potentially losing lighter fractions of the soil to the ambient air. At the conclusion of sampling the stainless steel scoop and bowl will be thoroughly cleaned and decontaminated using procedures outlined in Section 5.1.

The initial re-closable plastic bag will be placed inside a second bag as a precaution. A pre-printed sample label will be affixed to the outside of the inner re-closable bag as well as the sample ID number written on the outside of the inner bag. The outer re-closable plastic bag will also be labeled and marked similarly using the pre-printed sample ID numbers. Soil samples will be labeled with a unique sample identification number “TT-XXXXX” where “TT” indicates a “Troy TAPE” sample. Samples will remain under chain-of-custody procedures as described in Section 5.5.

The TAPE field team will attempt to restore the land surface to its prior condition after sampling, but Tetra Tech will not be responsible for re-laying sod or replanting. For most sample locations, the small area can be replaced with soil from immediately surrounding the excavation and lightly tamped down. In addition, each TAPE field team will have some commercially-available potting soil or quality topsoil available to repair any small excavations that cannot be easily filled with nearby soil materials. It is not envisioned that sampling will require large-scale disturbance of yards, since the sample size required is small.

4.4.4.3 Record Sample Location on Troy Property Map and with GPS

The field team will mark each soil subsample location on the property sketch with labeling to indicate the composite sample for which the subsample was collected. A Trimble Geo XT GPS will be used to record the midpoint subsample location for each composite soil sample. The GPS location coordinates will be recorded on the PDA unit with a unique identification number that corresponds with the sample point identification number "SP-XXXXXX." The GPS coordinates will also be recorded in the field logbook for backup and verification of sample locations. SP numbers for the Troy OU7 will begin at 500001 and then go up so they will not overlap with Libby OU4.

4.4.5 Photography

Each TAPE field team will have a camera for photo-documenting the conditions at a property, if the conditions are not readily described in writing or if, in the judgment of the field team, photographs may assist in development of a remedial action plan for that property. Permission from the property owner will be obtained before any photograph is taken, other than for photographs taken from the public right of way.

All photographs will be recorded in the field logbook, in the PDA, and on the property sketch using the following symbol to indicate the position where the photograph was taken and the direction it was taken (•→). Distance scales will not be used for landscape photographs, but general distances can be estimated by noting the location where the photograph was taken. All photographs will be taken using digital cameras and will be downloaded the same day at the Troy Tetra Tech field office and saved into the Troy project Scribe database. The photographs will then become part of the electronic record for the parcel.

5.0 FIELD QUALITY CONTROL PROCEDURES

Section 5.0 describes the methods and procedures for decontamination, quality assurance samples, field documentation, handling investigation-derived wastes, and maintaining chain of custody of samples and records.

5.1 EQUIPMENT AND PERSONNEL DECONTAMINATION

Dust samples will be collected using laboratory-provided filter cassettes with a new cassette and template for each sample collected. The air pump will not require decontamination between samples as a matter of course because of its position behind the sample filter during sample collection. If the exterior of the air pump becomes visibly dusty, it will be wiped clean with a damp paper towel to avoid transferring dust from one location to another.

Stainless steel scoops and bowls will be used for soil and building material sampling; therefore, decontamination of the equipment that is in touch with the soil will be necessary. If a small metal shovel is required to assist with sampling to 6 inches in hard, compacted soils, the shovel will be thoroughly cleaned and decontaminated. Decontamination will occur in the location where the sample was collected. and will include spraying the equipment with distilled water followed by drying with paper towels. The water will be allowed to fall on the ground surface within the area just sampled and the paper towels will be placed in a labeled garbage bag.

Visible soil on hands or clothing will be removed by washing with soap and water. Additional personnel decontamination procedures, including requirements for decontamination zones, are described in Section 9.2 of the HASP (Appendix A). PPE will include disposable gloves, disposable protective outerwear, work boots, disposable boot covers, and respirators. The respirators will be cleaned and decontaminated as discussed in the HASP (Appendix A).

5.2 QUALITY ASSURANCE SAMPLES

Field blank dust samples will be collected at a frequency of one blank sample per 20 samples, or at 5 percent. Each field team will collect one field blank dust sample per day. All dust sample blanks will be archived and one blank per 20 samples will be randomly selected from the archived samples. Field blank dust samples will be collected at locations selected by the TAPE field team, and will be collected by attaching a cassette to the pump and pumping for 1 minute at the same rate as for dust sample collection. However, the cassette will not have a nozzle, and the end of the cassette will be exposed to indoor air at the selected sampling location, rather than passed over a surface of any kind. Data for the field blank dust samples will be evaluated to assess whether a potential exists for airborne asbestos to cause analytical detections of asbestos in dust, or for cross-contamination to occur during sampling.

Dust lot blank samples will also be submitted to the laboratory for each lot or batch of cassettes received from the laboratory. Data for dust lot blank samples will be used to evaluate whether cartridges were received asbestos-free from the supplier. Tetra Tech will not use a cassette from a given lot until the dust lot blank results confirm the cartridges are asbestos-free.

Soil field equipment blanks will be collected at a rate of one per calendar week (Monday through Sunday) of sampling per field team. Field equipment blanks will be collected by placing silica sand (that is, asbestos-free as analyzed by polarized light microscopy) in a clean, decontaminated stainless steel sampling bowl, mixing it with a decontaminated stainless steel trowel, placing the sample in a re-closable plastic bag, and submitting it for analysis following the same polarized light microscopy methods. Data from field equipment blank samples will be used to evaluate whether the sampling equipment is asbestos-free.

Dust lot blank samples and field equipment blanks will be analyzed by the EMSL Laboratory located in Libby for analysis by method PLM-9002. In addition, during the initial portion of the field work, at least two dust samples per team will be sent to the EMSL Laboratory for rapid analysis. These samples will confirm that the field team members are using proper dust sampling techniques.

Dust field duplicate samples will be collected at a frequency of one sample per 20 composite dust samples or a rate of 5 percent. Field duplicate samples will be collected as samples collocated in the living area and will contain the same number of subsamples (30), but will be collected from different subsample locations. Data for dust field duplicates will be used to evaluate the potential variability in Libby amphibole concentrations in a specific land use area. These data will not be used to evaluate precision in sampling or analytical techniques.

Soil field duplicate samples will be collected at a frequency of one sample per 20 composite soil samples or a rate of 5 percent. Field duplicate samples will be collected as samples collocated in the same exterior use area (yard or landscaped area, for example) and will contain the same number of subsamples (30), but will be collected from different subsample locations. Data for soil field duplicates will be used to evaluate the potential variability in Libby amphibole concentrations in a specific land use area. These data will not be used to evaluate precision in sampling or analytical techniques.

All quality assurance samples will be submitted “blind” (labeled as a collected sample) to the laboratory.

5.3 FIELD DOCUMENTATION

Example PDA field forms are provided in Appendix E. Before the TAPE field activities begin, all members of the Tetra Tech field team will receive the same training on implementation of this work plan in general and on use of the PDA forms in particular. Property owner interviews, property inspections, and sample collections will be conducted using the PDA to ensure consistency between properties and between TAPE field teams. Use of the PDA will also allow compilation of TAPE-derived data into the Troy project Scribe database prior to transfer to the Libby V2 database (see Section 5.5).

Any additional information that is not recorded on field forms will be recorded in the TAPE field logbooks. Each logbook issued to a field team will be numbered with a prefix of TR. Each field team will maintain a field logbook for recording the date and time of each property inspection, the names of the people who allowed property access and completed the interview, the property ID and building ID numbers, the number and type of samples collected at the property including sample ID numbers and any other pertinent information. A new page will be started in the field logbook for each property. The field logbook will serve as an independent (backup) record for all activities conducted and samples collected at a property, in the event that the PDA data are lost or corrupted. The field logbook will also be used to record additional observations of the field team that relate to potential remedial action at a property, such as locations, quantities and types of suspect asbestos-containing material that is not VCI or Libby amphibole, and access limitations that were not noted in the PDA. The field logbooks will be scanned into a PDF format and stored as part of the electronic record for each property.

Information will also be recorded on the individual property sketches. Property maps consisting of aerial photographs will be provided for reference; however, the quality of the photographs does not allow for use as a base map for each property. Property sketches will show the locations of any observed VCI and Libby amphibole-containing rock, primary and secondary buildings and the main entrance of each building, and the outdoor sample (including general subsample) locations. The property sketches will be scanned into a PDF format and stored as part of the electronic record for the property.

5.4 CONTAINMENT AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

Investigation-derived waste will include used wet wipes, wet paper towels, disposable gloves, used respirator cartridges, used plastic tubing, disposable protective outerwear, plastic floor coverings, and other minimal waste. It is possible, but not likely, that these investigation-derived waste materials may contain some asbestos. Therefore, all investigation-derived waste will be double-bagged in appropriate asbestos bags, labeled with asbestos labels, and stored in approved containment at the DEQ Troy Information Center/Tetra Tech field office until it can be properly disposed of at an approved landfill (Lincoln County outside of Libby). Non-sampling waste generated by the TAPE field teams, such as food containers and waste paper, will be separately bagged and properly disposed of as solid waste.

5.5 RECORD KEEPING AND CHAIN OF CUSTODY

At the end of each day, or more often if required, the TAPE field teams will return to the Troy Tetra Tech field office to download the PDA and transfer the dust, soil, and QC samples and copies of the appropriate logbook pages to the Tetra Tech sample coordinator (or the coordinator's designee). An individual file (both paper and electronic) will be maintained for each property inspected. Photocopies of all field forms and appropriate logbook pages in each individual property file will be maintained in the Troy field office for the duration of the TAPE project so that information is available if questions arise. A backup electronic copy of the Troy Scribe database will be stored in the Tetra Tech office in Helena, Montana, and updated periodically for the duration of the sampling, inspection, and reporting phases of the TAPE project. A complete electronic copy of the Troy Scribe database will be transferred to DEQ at the end of the TAPE project. Copies of all property sketches, QA/QC records, and field logbooks will be available on request at any time during the TAPE project to DEQ, EPA, or to the Troy property owners.

After the PDA electronic information is downloaded to the Troy Tetra Tech database, from the TAPE field teams, the Tetra Tech field sample coordinator will check all location, building, and sample ID numbers for accuracy. The Tetra Tech field sample coordinator will then print out a hard copy of the QC sign-off record and chain-of-custody form and store these records with the associated dust and soil samples collected for the Troy properties. The QC sign-off record and chain-of-custody report will be transferred to the ESAT Troy sample coordinator.

Until samples have been transferred to the ESAT Troy sample coordinator, all TAPE samples will be securely held by Tetra Tech. Samples may be stored in locked vehicles or in a secured (locked) area of the Troy Tetra Tech field office. All TAPE samples collected from the Troy properties, including QC samples, will be transferred to the ESAT Troy sample coordinator at least on a monthly basis. The ESAT Troy sample coordinator will provide Tetra Tech with a copy of the released chain-of-custody, pursuant to the electronic chain of custody SOP (Appendix B). An example chain-of-custody form is in Appendix E. The ESAT Troy sample coordinator will then transfer the samples to the on-site laboratory for preparation and then to an off-site laboratory for analysis.

Digital photographs will be downloaded daily to a computer at the Tetra Tech Troy field office. Photographs will be downloaded into the Troy project Scribe database based on property and building ID numbers. Individual photographs will not be routinely printed from the Troy field office.

5.6 SAMPLE MANAGEMENT

At the end of each day the field teams will transfer all samples to the Troy Tetra Tech field sample coordinator. The samples will be entered into a sample log and placed into the sample storage area by the Troy field sample coordinator. The field sample coordinator will store the samples in a secure storage area until the samples are transferred to the ESAT sample preparation laboratory under a chain-of-custody.

6.0 DATA MANAGEMENT

Data management during the inspection and sampling will be under the supervision of the Tetra Tech TAPE field sample coordinator in the Troy field office. At the conclusion of inspection and sampling, that responsibility will pass to the Tetra Tech TAPE project manager.

6.1 GEOGRAPHIC DATA AQUISTION

The three townships comprising the Troy study area are one of the few portions of Montana that does not yet have a completed cadastral GIS database. As a result, a digitized GIS feature layer was built in order to identify the parcels and their owners within the study area.

Two dozen paper plat maps with the parcels covering the study area were scanned and georegistered in ArcGIS 9.1 to the Montana State Plane NAD83 geographic coordinate system. Some twelve hundred parcels were digitized from the plat maps with parcel numbers and owner names added to the geodatabase. The unique parcel numbers will be used to build the AD-numbers (parcel identification codes) used in the Scribe project databases.

Using the legal descriptions and the owner names from the scanned plat maps, individual parcels were matched to the Montana Department of Revenue’s Computer Assisted Mass Appraisal (CAMA) database. The CAMA database contains both owner and property mailing addresses, parcel descriptions and unique 17 character parcel geocodes. The parcel geocodes allow the geodatabase to be updated as the state of Montana cadastral database is completed for Troy, as parcel owners change, and as the property addresses are changed to conform with the new electronic 911 system for Lincoln County in mid-2007.

The finished parcel features can be overlaid on recent 1-meter resolution aerial photography from 2005 to obtain information on buildings, driveways, and ground disturbances on the properties within the Troy study area.

6.2 PROJECT DATABASES

Four project databases will be built to track different processes at Troy.

- **The Planning Project dataset** will manage property information and track the status of access agreements. This dataset contains parcel maps from the GIS geodatabase as well as the relevant information contained in the CAMA database. This dataset will be the source of all parcel identification codes (AD- numbers) used in the community involvement and operations datasets.
- **The Community Involvement Coordinator (CIC) Project dataset** will log and track community interactions at Troy. This dataset will be linked to the planning dataset using a parcel identification code (Scribe property IDs) as a foreign key.
- **The Operations Project dataset** will be used to manage all data collected by the Troy field teams. These field teams will collect all data electronically using Trimble GeoXT GPS units loaded with ArcPAD software from ESRI. ArcPAD forms will be pre-populated on a daily basis before field crews are dispatched. At the end of each day, data will be downloaded to the operations dataset in Scribe. The operations dataset will also be used to produce sample receipts for property owners, generate chains-of-custody, and manage data generated by on-site sample preparation activities. The operations dataset will be the source of all sample identification codes (sample IDs) used in the analytical dataset. The operations dataset will also be linked to the planning dataset using a property identification code (Scribe property IDs) as a foreign key. Completed access agreements, property sketches, and field notes will be scanned to PDF and these files, along with all the digital photos collected in the field, will be managed using a local file structure.
- **The Analytical Project dataset** will be used to manage all data generated by laboratories during the analytical process. Laboratories will submit standard EPA electronic data deliverables (EDD) and these EDDs will be loaded to the analytical project in Scribe. The analytical dataset will be linked to the operations dataset using both a sample identification code (Scribe sample IDs) and a sampling location identification code (Scribe location IDs) as foreign keys.

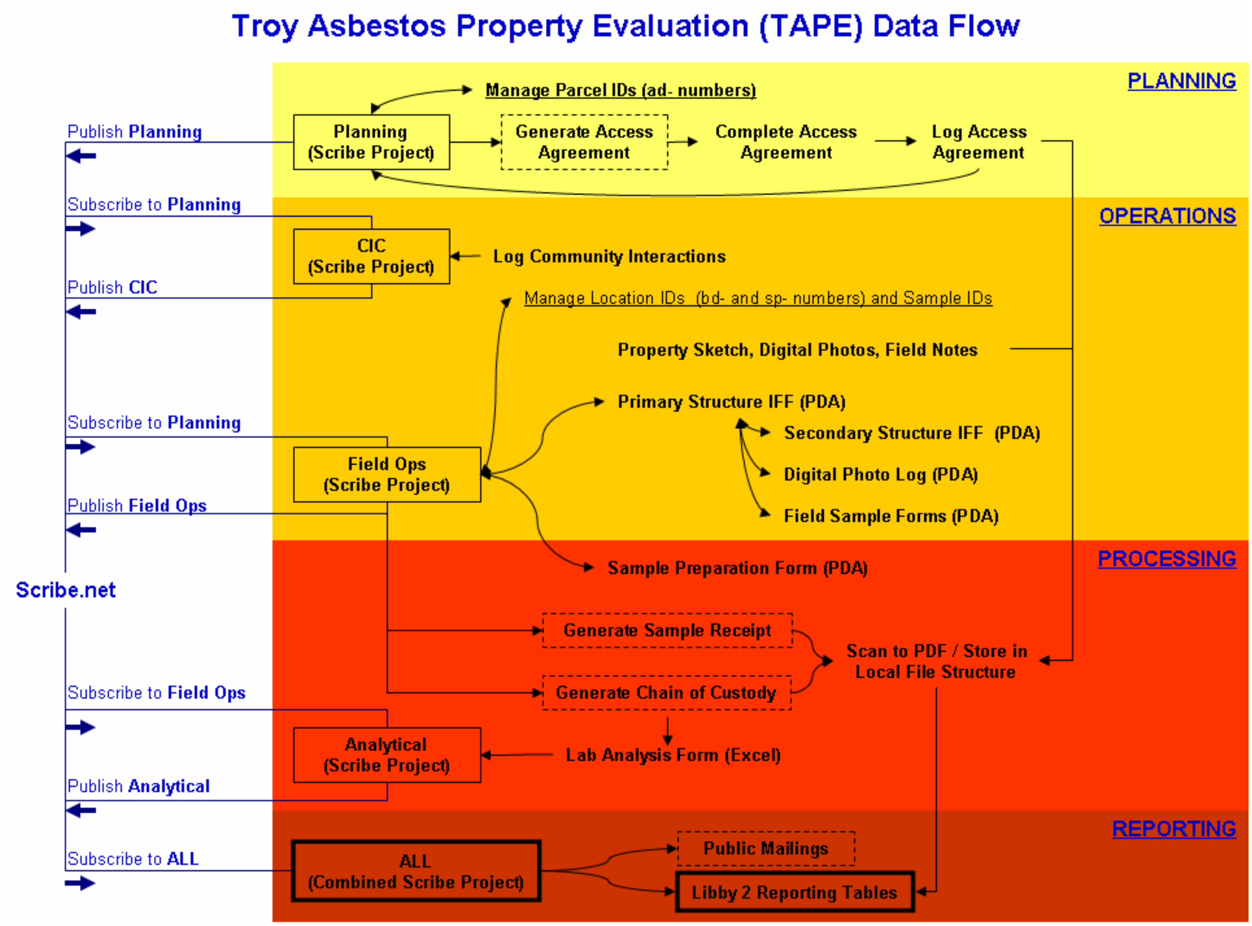

Diagram of data flow processes for Troy (courtesy USEPA-Denver).

7.0 QA/QC PROCEDURES

The TAPE quality objectives, QC checks and samples, and audits completed for the TAPE project are described in the sections below. Field quality control procedures are described in Section 5.0 above. A description of soil sample preparation is in Appendix F and laboratory quality assurance/quality control procedures are in Appendix G.

7.1 QA/QC OBJECTIVES

The quality objectives of the TAPE project are to obtain 100 percent usable and accurate data. These data will be achieved through inspection and sampling using standardized PDA data entry procedures, auditing field operations, observing chain-of-custody procedures, and analyzing field quality control samples and laboratory quality control samples. The DQOs are further discussed in Section 3.0 of this work plan.

7.2 INTERNAL QC CHECKS

When laboratory analytical data are received, Tetra Tech will conduct a thorough quality review of those data. Tetra Tech will review data from both laboratory QC samples described below and field QC samples described in Section 5.2. Standard protocols exist for validation of soil samples analyzed by polarized light microscopy for asbestos and will be followed. Standard protocols do not exist for validation of dust samples for asbestos; however, DEQ and Tetra Tech will follow the QC review procedures for dust data established at the Libby Asbestos Superfund Site. DEQ and Tetra Tech will prepare validation and review packages for all TAPE data to be included in the TAPE project report.

Dust and soil samples will be analyzed by one of the contract laboratories following Libby Asbestos Superfund Site protocols, including EPA's most recent protocols relating to QA/QC for the Libby Asbestos Superfund Site. As such, the QA/QC protocols followed by the laboratories are not within Tetra Tech's immediate control.

Laboratory QA/QC samples and standard protocols that the contract laboratory will perform for routine analysis will include appropriate laboratory procedures for the analyses of the following sample types:

- Preparation of duplicate samples
- Preparation of laboratory equipment blanks (grinding and other equipment)
- Method blank samples
- Matrix spike/matrix spike duplicates
- Laboratory control samples/laboratory control duplicates

- Standard reference material
- Surrogates

Data will be entered into the Libby V2 project database only after a 100 percent QC of the data.

7.3 AUDITS, CORRECTIVE ACTIONS, AND QA REPORTS

Field audits will be an integral part of Tetra Tech's field operations for the duration of the TAPE project. Field audits and corrective actions will be the responsibility of EPA and the Tetra Tech QA/QC manager. (See Section 2.0 and Table 2-1 for designated key project personnel.) EPA Region 8 personnel have stated their intent to audit the TAPE project during the 2007 field season. The TAPE project report will include a discussion of data quality that will include a summary of field audit results. Copies of field audit forms will be provided as an appendix to the TAPE project report.

7.3.1 Field Inspections and Sampling Procedures Audits

The Tetra Tech QA/QC manager will be responsible for audits of TAPE field inspections and sampling procedures. Audits will be conducted daily for the first five days of inspection and sampling and at least biweekly for the duration of the TAPE. Audits will consist of the QA/QC manager or his designee attending a Troy property inspection and sampling event and observing the TAPE field team's activities. The field team will not be warned of the audit. The auditor will compare the field team's activities with the protocols provided in this work plan and the attached project-specific guidance and SOPs and evaluate compliance with the protocols using the audit form provided in Appendix E. After the audit, the auditor will provide the completed audit form to the DEQ, EPA, and Tetra Tech project managers.

7.3.2 Corrective Action Procedures

The QA/QC auditor may use his or her discretion to provide immediate verbal feedback to the TAPE field team, if necessary, to ensure that deficiencies are fixed as quickly as possible. The Tetra Tech field team leader and QA/QC manager will review the report with the TAPE field team within 48 hours of the audit to correct any deviations or deficiencies. If any deviations or deficiencies were noted, the field team will be audited again within one week of the original audit to ensure that any deficiencies have been fixed.

If gross deficiencies are noted, the Tetra Tech QA/QC manager will determine whether re-inspection or re-sampling of any Troy properties is required. Re-inspection or re-sampling will be required only if the TAPE field team failed to correctly identify VCI during inspection, collected samples incorrectly, or collected a grossly inadequate number of samples.

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APPENDIX A

SITE-SPECIFIC HEALTH AND SAFETY PLAN
TROY ASBESTOS PROPERTY EVALUATION

APPENDIX B

STANDARD OPERATING PROCEDURES (SOPs)
TROY ASBESTOS PROPERTY EVALUATION

Tetra Tech - Troy

- Tetra Tech TAPE PDA Field Manual, Version 01
- Tetra Tech TAPE Soil Sampling Guidance and Visual Estimate of Vermiculite Content, Version 01

CDM/EPA – Libby

- CDM-Libby-03 Completion of Field Sampling Data Sheets
- CDM-Libby-04 Completion of Inspection Field Forms
- CDM-Libby-05 Site-Specific Standard Operating Procedure for Soil Sample Collection

American Society for Testing and Materials (ASTM)

- ASTM D5755-03

Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Surface Loading

APPENDIX C

EQUIPMENT/SUPPLIES LIST
TROY ASBESTOS PROPERTY EVALUATION

APPENDIX D

SAMPLE COVER LETTER, ACCESS AGREEMENT, AND SAMPLE RECEIPT
TROY ASBESTOS PROPERTY EVALUATION

APPENDIX E

FIELD FORMS
TROY ASBESTOS PROPERTY EVALUATION

APPENDIX F

SOIL SAMPLE PREPARATION
QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

APPENDIX G

LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

TETRA TECH, INC.

FIELD AUDIT CHECKLIST

Project Name: ________________________ Project No.: ____________________

Field Location: ________________________ Completed by: ____________________

Project Manager: ____________________ Site Safety Coordinator: ____________________

General Items		In Compliance?		
Health and Safety Plan Requirements		Yes	No	NA
1	Approved health and safety plan (HASP) on site or available			
2	Names of on-site personnel recorded in field logbook or daily log			
3	HASP compliance agreement form signed by all on-site personnel			
4	Material Safety Data Sheets on site or available			
5	Designated site safety coordinator present			
6	Daily tailgate safety meetings conducted and documented			
7	On-site personnel meet HASP requirements for medical examinations, fit testing, and training (including subcontractors)			
8	Compliance with specified safe work practices			
9	Documentation of training, medical examinations, and fit tests available from employer			
10	Exclusion, decontamination, and support zones delineated and enforced			
11	Windsock or ribbons in place to indicate wind direction			
12	Illness and injury prevention program reports completed (California only)			
Emergency Planning				
13	Emergency telephone numbers posted			
14	Emergency route to hospital posted			
15	Local emergency providers notified of site activities			
16	Adequate safety equipment inventory available			
17	First aid provider and supplies available			
18	Eyewash stations in place			
Air Monitoring				
19	Monitoring equipment specified in HASP available and in working order			
20	Monitoring equipment calibrated and calibration records available			
21	Personnel know how to operate monitoring equipment and equipment manuals available on site			
23	Environmental and personnel monitoring performed as specified in HASP			

TETRA TECH, INC.

FIELD AUDIT CHECKLIST (Continued)

Safety Items		In Compliance?		
Personal Protection		Yes	No	NA
1	Splash suit			
2	Chemical protective clothing			
3	Safety glasses or goggles			
4	Gloves			
5	Overboots			
6	Hard hat			
7	Dust mask			
8	Hearing protection			
9	Respirator			
Instrumentation				
10	Combustible gas meter			
11	Oxygen meter			
12	Organic vapor analyzer			
Supplies				
13	Decontamination equipment and supplies			
14	Fire extinguishers			
15	Spill cleanup supplies			
Corrective Action Taken During Audit:				
Corrective Action Still Needed:				

Note: NA = Not applicable

Auditor's Signature

Site Safety Coordinator's Signature

Date

TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT

To: ______________________________
Subsidiary Health and Safety Representative

Cc: ______________________________
Workers Compensation Administrator

Project name: ______________________________

Project number. ______________________________

Prepared by: ______________________________

Position: ______________________________

Office: ______________________________

Telephone number: ______________________________

Fax number: ______________________________

Information Regarding Injured or Ill Employee

Name: ______________________________

Home address: ______________________________

____

Home telephone number: ______________________________

Occupation (regular job title): ______________________________

Department: ______________________________

Office: ______________________________

Gender: M ☐ F ☐ No. of dependents: ________

Marital status: ______________________________

Date of birth: ______________________________

Social Security Number: ______________________________

Date of Accident: ______________________________

Time Employee Began Work: ________________

Time of Accident: ______________ a.m. ☐ p.m. ☐

☐ Check if time cannot be determined

Location of Accident

Street address: ______________________________

City, state, and zip code: ______________________________

County: ______________________________

Was place of accident or exposure on employer's premises? Yes ☐ No ☐

Information About the Case

What was the employee doing just before the incident occurred?: Describe the activity, as well as the tools, equipment, or material the employee was using. Be specific. Examples: "climbing a ladder while carrying roofing materials"; "spraying chlorine from hand sprayer"; "daily computer key-entry."

What Happened?: Describe how the injury occurred. Examples: "When ladder slipped on wet floor, worker fell 20 feet"; "Worker was sprayed with chlorine when gasket broke during replacement"; "Worker developed soreness in wrist over time."

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

Information About the Case (Continued)

What was the injury or illness? Describe the part of the body that was affected and how it was affected; be more specific than "hurt," "pain," or "sore." Examples "strained back"; "chemical burn, right hand"; "carpal tunnel syndrome, left wrist."

Describe the Object or Substance which Directly Harmed the Employee: Examples: "concrete floor"; "chlorine"; "radial arm saw." If this question does not apply to the incident, enter a NA.

Did the employee die? Yes ☐ No ☐ Date of death: ___________________________

Was employee performing regular job duties? Yes ☐ No ☐

Was safety equipment provided? Yes ☐ No ☐ Was safety equipment used? Yes ☐ No ☐

Note: Attach any police reports or related diagrams to this accident report.

Witness(es):

Name: ___________________________

Company: ___________________________

Street address: ___________________________

City: ___________________________ State:_____________ Zip code:_______________

Telephone number: ___________________________

Name: ___________________________

Company: ___________________________

Street address: ___________________________

City: ___________________________ State:_____________ Zip code:_______________

Telephone number: ___________________________

Medical Treatment Required? ☐ Yes ☐ No ☐ First Aid only

Name of physician or health care professional: ___________________________

If treatment was provided away from the work-site, where was it given?

Facility name: ___________________________

Street address: ___________________________

City: ___________________________ State:_____________ Zip code:_______________

Telephone number: ___________________________

Was the employee treated in an emergency room? ☐ Yes ☐ No

Was the employee hospitalized overnight as an in-patient? ☐ Yes ☐ No

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

Corrective Action(s) Taken by Unit Reporting the Accident:

Corrective Action Still to be Taken (by whom and when):

Name of Tetra Tech employee the injury or illness was first reported to: ____________________________

Date of Report: ____________________________ **Time of Report:** ____________________________

I have reviewed this investigation report and agree, to the best of my recollection, with its contents.

Printed Name of Injured Employee

Telephone Number

Signature of Injured Employee

Datee

The signatures provided below indicate that appropriate personnel have been notified of the incident.

Title	Printed Name	Signature	Telephone Number	Date
Project or Office Manager				
Site Safety Coordinator				

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH, INC.

ACCIDENT AND ILLNESS INVESTIGATION REPORT (Continued)

To be completed by the Subsidiary Safety and Health Representative:

Classification of Incident:

☐ Injury ☐ Illness

Result of Incident:

☐ First Aid Only

☐ Days Away From Work

☐ Remained at Work but Incident Resulted in Job Transfer or Work Restriction

☐ Incident Involved Days Away and Job Transfer or Work Restriction

☐ Medical Treatment Only

No. of Days Away From Work ______________________________

Date Employee Left Work ______________________________

Date Employee Returned to Work ______________________________

No. of Days Placed on Restriction or Job Transfer: ______________________________

OSHA Recordable Case Number ______________________________

To be completed by Human Resources:

SSN: ______________________________

Date of hire: ____________________ Hire date in current job: ____________________

Wage information: $__________ per ☐ Hour ☐ Day ☐ Week ☐ Month

Position at time of hire: ______________________________

Current position: ____________________ Shift hours: ____________________

State in which employee was hired: ______________________________

Status: ☐ Full-time ☐ Part-time Hours per week: ________ Days per week: ________

Temporary job end date: ______________________________

To be completed during report to workers' compensation carrier:

Date reported: ____________________ Reported by: ____________________

Confirmation number: ______________________________

Name of contact: ______________________________

Field office of claims adjuster: ______________________________

This form contains information relating to employee health and must be used in a manner that protects the confidentiality of the employee to the extent possible while the information is being used for occupational safety and health purposes.

TETRA TECH, INC.

HEALTH AND SAFETY PLAN COMPLIANCE AGREEMENT

Project Name: ____

Project Number: ____

I have read and understand the health and safety plan indicated above and agree to comply with all of its provisions. I understand that I could be prohibited from working on the project for violating any of the safety requirements specified in the plan.

Name	Signature	Employer	Date

TETRA TECH, INC.

DAILY TAILGATE SAFETY MEETING FORM

Date: ______________ Time: ________________ Project No.: ________________

Client: __________________________________ Site Location: __________________________

Site Activities Planned for Today: ____

____

Safety Topics Discussed
Protective clothing and equipment:
Chemical hazards:
Physical hazards:
Environmental and biohazards:
Equipment hazards:
Decontamination procedures:
Other:
Review of emergency procedures:
Employee Questions or Comments:

TETRA TECH, INC.

DAILY TAILGATE SAFETY MEETING FORM (Continued)

Attendees	
Printed Name	**Signature**

Meeting Conducted by:

______________________________ ______________________________
Name Title

____
Signature

TETRA TECH, INC.

DAILY SITE LOG

Site Name:_______________________________________ Date: ___________________________

Name (print)	Company	Time	
		In	Out

Comments:

____

____

____

TETRA TECH, INC.

HEALTH AND SAFETY MANUAL

VOLUME III

SAFE WORK PRACTICES (SWP)

GENERAL SAFE WORK PRACTICES

SWP NO.: 6-1

ISSUE DATE: JULY 1998

REVISION NO.: 1

GENERAL SAFE WORK PRACTICES

To prevent injuries and adverse health effects, the following general safe work practices (SWP) are to be followed when conducting work involving known and unknown site hazards. These SWPs establish a pattern of general precautions and measures for reducing risks associated with hazardous site operations. This list is not inclusive and may be amended as necessary.

- Do not eat, drink, chew gum or tobacco, take medication, or smoke in contaminated or potentially contaminated areas or where the possibility for the transfer of contamination exists.
- Wash hands and face thoroughly upon leaving a contaminated or suspected contaminated area. A thorough shower and washing must be conducted as soon as possible if excessive skin contamination occurs.
- Avoid contact with potentially contaminated substances. Do not walk through puddles, pools, mud, or other such areas. Avoid, whenever possible, kneeling on the ground or leaning or sitting on drums, equipment, or the ground. Do not place monitoring equipment on potentially contaminated surfaces.
- Remove beards or facial hair that interfere with a satisfactory qualitative respirator fit test or routine pre-entry positive and negative pressure checks.
- Be familiar with and knowledgeable of and adhere to all instructions in the site-specific health and safety plan (HASP). At a minimum, a safety meeting will be held at the start of each project to discuss the HASP. Additional meetings will be held, as necessary, to address new or continuing safety and health concerns.
- Be aware of the location of the nearest telephone and all emergency telephone numbers.
- Attend a briefing on the anticipated hazards, equipment requirements, SWPs, emergency procedures, and communication methods before going on site.
- Plan and delineate entrance, exit, and emergency escape routes.
- Rehearse unfamiliar operations prior to implementation.
- Use the “buddy system” whenever respiratory protection equipment is in use. Buddies should establish hand signals or other means of emergency communication in case radios break down or are unavailable.
- Buddies should maintain visual contact with each other and with other on-site team members by remaining in close proximity in order to assist each other in case of emergency.

- Minimize the number of personnel and equipment in contaminated areas (such as the exclusion zone). Nonessential vehicles and equipment should remain within the support zone.

- Establish appropriate support, contamination reduction, and exclusion zones.

- Establish appropriate decontamination procedures for leaving the site.

- Immediately report all injuries, illnesses, and unsafe conditions, practices, and equipment to the site safety coordinator (SSC).

- Maintain a portion of the site field logbook as a project safety log. The project safety log will be used to record the names, entry and exit dates, and times on site of all Tetra Tech, subcontractor, and project site visitor personnel; air quality and personal exposure monitoring data; and other information related to safety matters. Form SSC-1, Daily Site Log, may be used to record names of on-site personnel.

- A portable eyewash station should be located in the support zone if chemical splashes to eyes are possible.

- Do not bring matches and lighters in the exclusion zone or contamination reduction zone.

- Observe coworkers for signs of toxic exposure and heat or cold stress.

- Inform coworkers of nonvisual effects of illness if you experience them, such as headaches, dizziness, nausea, or blurred vision.

TETRA TECH, INC.

HEALTH AND SAFETY MANUAL

VOLUME III

SAFE WORK PRACTICES (SWP)

FALL PROTECTION PRACTICES

SWP NO.: 6-9

ISSUE DATE: JULY 1998

REVISION NO.: 1

FALL PROTECTION PRACTICES

This safe work practice (SWP) presents general guidelines for basic fall protection when working in elevated areas. Continuous elevated work or elevated construction work will require detailed procedures included in a site-specific health and safety plan. SWP No. 6-10, “Portable Ladder Safety,” should also be consulted. During elevated work, the precautions below must be taken.

- All fall hazards should be identified at work sites with the potential for elevated work. Once an elevated fall hazard has been recognized, an appropriate control measure must be selected. Priority should be given to elimination of the fall hazard over the use of fall protection equipment.
- Approved safety harnesses and lanyards shall be worn by employees whose work exposes them to falls of greater than 6 feet.
- Lanyards should be anchored at a level no lower than the employee’s waist to limit the fall distance to a maximum of 4 feet and to not allow the employee to contact the next lower work level, where practical.
- All fall protection devices should be used only in accordance with manufacturer’s recommendations.
- All fall protection devices shall be inspected daily before use.
- Any lifeline, harness, or lanyard actually subjected to in-service loading (a fall) should be immediately removed from service and not used again for employee fall protection.
- Anchor points and lanyards capable of supporting a minimum dead weight of 5,400 pounds should be used.
- Employees who are required to wear fall protection should be trained in the use of the equipment, as well as in fall protection work practices.

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SAFE WORK PRACTICES (SWP)

PORTABLE LADDER SAFETY

SWP NO.: 6-10

ISSUE DATE: JULY 1998

REVISION NO.: 1

PORTABLE LADDER SAFETY

This safe work practice (SWP) applies to portable ladders only. Fixed ladder systems shall be used when regular access is required such as for entering storage tanks and raised work platforms. These SWPs follow the regulatory requirements for ladders as found in Title 29 of the *Code of Federal Regulations* (CFR) Part 1926.1053. Procedures to ensure portable ladder safety are listed below.

- Ladders should be maintained in good condition at all times. Damaged ladders shall be withdrawn from service immediately.
- Ladders should be inspected regularly and removed from service and repaired or discarded if defective.
- Rungs should have slip-resistant surfaces and be kept free of grease and oil.
- Tops and pail shelves of portable stepladders should not be used as steps.
- Rung and cleat ladders should be placed so that the horizontal distance from the top support to the foot of the ladder is one-quarter of the working length of the ladder.
- Ladders should not be placed in front of doorways, drives, or passageways.
- Ladders should not be placed on boxes, barrels, or other unstable bases to add height.
- Employees should always face the ladder during ascent or descent.
- Metal ladders should not be used in areas with the potential for contact with electric circuits.
- Ladder side rails shall extend at least 3 feet above the upper landing surface to which the ladder is used to access.
- Ladder shall be used only on stable and level surfaces. Do not use ladders on slippery surfaces.

TETRA TECH, INC.

HEALTH AND SAFETY MANUAL

VOLUME III

SAFE WORK PRACTICES (SWP)

HEAT STRESS

SWP NO.: 6-15

ISSUE DATE: JULY 1998

REVISION NO.: 1

HEAT STRESS

This safe work practice (SWP) describes situations where heat stress is likely to occur and provides procedures for the prevention and treatment of heat-related injuries and illnesses. Wearing personal protective equipment (PPE), especially during warm weather, puts employees at considerable risk of developing heat-related illness. Health effects from heat stress may range from transient heat fatigue or rashes to serious illness or death.

Many factors contribute to heat stress, including PPE, ambient temperature and humidity, workload, and the physical condition of the employee, as well as predisposing medical conditions. However, the primary factors are elevated ambient temperatures in combination with fluid loss. Because heat stress is one of the more common health concerns that may be encountered during field activities, employees must be familiar with the signs, symptoms, and various treatment methods of each form of heat stress. Heat stroke is the most serious heat-related illness—it is a threat to life and has a 20 percent mortality rate. Direct exposure to sun, poor air circulation, poor physical condition, and advanced age directly affect the tendency to heat stroke. Table 1 lists the most serious heat conditions, their causes, signs and symptoms, and treatment.

Training is an important component of heat stress prevention. Employees are instructed to recognize and treat heat-related illnesses during 8-hour health and safety refresher and first aid training courses. When working in hot environments, specific steps should be taken to lessen the chances of heat-related illnesses. These include the following:

- Ensuring that all employees drink plenty of fluids (Gatorade® or its equivalent)
- Ensuring that frequent breaks are scheduled so overheating does not occur
- Revising work schedules, when necessary, to take advantage of the cooler parts of the day (such as working from 5:00 a.m. to 11:00 a.m. and 6:00 p.m. to nightfall).

When PPE must be worn (especially Levels A and B), suggested guidelines relating to ambient temperature and maximum wearing time per excursion are as shown in Table 2.

TABLE 1

HEAT STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Heat cramps	Fluid loss and electrolyte imbalance from dehydration	• Painful muscle cramps, especially in legs and abdomen • Faintness • Profuse perspiration	• Move affected worker to cool location • Provide sips of liquid such as Gatorade® • Stretch cramped muscles • Transport affected worker to hospital if condition worsens
Heat Exhaustion	Blood transport to skin to dissipate excessive body heat, resulting in blood pooling in the skin with inadequate return to the heart	• Weak pulse • Rapid and shallow breathing • General weakness • Pale, clammy skin • Profuse perspiration • Dizziness • Unconsciousness	• Move affected worker to cool area • Remove as much clothing as possible • Provide sips of cool liquid or Gatorade® (only if conscious) • Fan the person but do not overcool or chill • Treat for shock • Transport to hospital if condition worsens
Heat Stroke	Life threatening condition from profound disturbance of body's heat-regulating mechanism	• Dry, hot, and flushed skin • Constricted pupils • Early loss of consciousness • Rapid pulse • Deep breathing at first, and then shallow breathing • Muscle twitching leading to convulsions • Body temperature reaching 105 or 106 °F or higher	• Immediately transport victim to medical facility • Move victim to cool area • Remove as much clothing as possible • Reduce body heat promptly by dousing with water or wrapping in wet cloth • Place ice packs under arms, around neck, at ankles, and wherever blood vessels are close to skin surface • Protect patient during convulsions

TABLE 2

SUGGESTED GUIDELINES WHEN WEARING PPE

Ambient Temperature	Maximum PPE Wearing Time per Excursion
Above 90 °F	15 minutes
85 to 90 °F	30 minutes
80 to 85 °F	60 minutes
70 to 80 °F	90 minutes
60 to 70 °F	120 minutes
50 to 60 °F	180 minutes

Source: National Institute for Occupational Safety and Health (NIOSH). 1985. Memorandum Regarding Recommended Personal Protective Equipment Wearing Times at Different Temperatures. From Austin Henschel. To Sheldon Rabinovitz. June 20.

To monitor the level of an employee's heat stress, the following should be measured:

- Heart Rate: Count the radial (wrist) pulse during a 30-second period as early as possible in the rest period; if heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same.

  If the heart rate still exceeds 110 beats per minute at the next period, shorten the following work cycle by one-third.

- Oral Temperature: Use a clinical thermometer (3 minutes under the tongue) to measure the oral temperature at the end of the work period. If oral temperature exceeds 99.6 °F (37.6 °C), shorten the next work cycle by one-third without changing the rest period. If oral temperature still exceeds 99.6 °F at the beginning of the next rest period, shorten the following work cycle by one-third. Do not permit a worker to wear impermeable PPE when his or her oral temperature exceeds 100.6 °F (38.1 °C).

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HEALTH AND SAFETY MANUAL

VOLUME III

SAFE WORK PRACTICES (SWP)

COLD STRESS

SWP NO.: 6-16

ISSUE DATE: JULY 1998

REVISION NO.: 1

COLD STRESS

This safe work practices (SWP) describes situations where cold stress is likely to occur and discusses procedures for the prevention and treatment of cold-related injuries and illnesses. Cold conditions may present health risks to employees during field activities. The two primary factors that influence the risk potential for cold stress are temperature and wind velocity. Wetness can also contribute to cold stress. Other factors that increase susceptibility to cold stress include age (very young or old), smoking, alcohol consumption, fatigue, and wet clothing. Hypothermia can occur at temperatures above freezing if the individual has on wet or damp clothing or is immersed in cold water. The combined effect of temperature and wind can be evaluated using a wind chill index as shown in Table 1.

Bare flesh and body extremities that have high surface area-to-volume ratios such as fingers, toes, and ears are most susceptible to wind chill or extremely low ambient temperatures. Because cold stress can create the potential for serious injury or death, employees must be familiar with the signs and symptoms and various treatments for each form of cold stress. Table 2 provides information on frostbite and hypothermia, the two most common forms of cold-related injuries.

Training is an essential component of cold stress prevention. Employees are instructed to recognize and treat cold-related injuries during 8-hour health and safety refresher and first aid training courses. When working in cold environments, specific steps should be taken to lessen the chances of cold-related injuries. These include the following:

- Protecting of exposed skin surfaces with appropriate clothing (such as face masks, handwear, and footwear) that insulates, stays dry, and blocks wind
- Shielding the work area with windbreaks to reduce the cooling effects of wind
- Providing equipment for keeping workers' hands warm by including warm air jets and radiant heaters in addition to insulated gloves
- Using adequate insulating clothing to maintain a body core temperature of above 36 °C
- Providing extra insulating clothing on site

TABLE 1

COOLING POWER OF WIND ON EXPOSED FLESH EXPRESSED AS EQUIVALENT TEMPERATURE

Estimated Wind Speed (in miles per hour - mph)	Actual Temperature Reading (°F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (°F)											
CALM	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little additional effect.)	*LITTLE DANGER* in less than 1 hour with dry skin; maximum danger from false sense of security				*INCREASING DANGER* from freezing of exposed flesh within 1 minute				*GREAT DANGER* that flesh may freeze within 30 seconds			
	Trench foot may occur at any point on this chart.											

Source: Modified from American Conference of Governmental Industrial Hygienists. 1997. "Threshold Limit Values for Chemical Substances and Physical Agents."

TABLE 2

COLD STRESS CONDITIONS

Condition	Causes	Signs and Symptoms	Treatment
Frostbite	Freezing of body tissue, usually the nose, ears, chin, cheeks, fingers, or toes	• Pain in affected area that later goes away • Area feels cold and numb • Incipient frostbite (frostnip) - skin is blanched or whitened and feels hard on the surface • Moderate frostbite - large blisters • Deep frostbite - tissues are cold, pale, and hard	• Move affected worker to a warm area • Immerse affected body part in warm (100 to 105 °F) water—not hot! • Handle affected area gently; do not rub • After warming, bandage loosely and seek immediate medical treatment
Hypothermia	Exposure to freezing or rapidly dropping temperatures	• Shivering, dizziness, numbness, weakness, impaired judgment, and impaired vision • Apathy, listlessness, or sleepiness • Loss of consciousness • Decreased pulse and breathing rates • Death	• Immediately move affected person to warm area • Remove all wet clothing and redress with loose, dry clothes • Provide warm, sweet drinks or soup (only if conscious) • Seek immediate medical treatment

- Reducing the duration of exposure to cold
- Changing wet or damp clothing as soon as possible

During periods of extreme cold (10 °F or less) workers should use the buddy system to ensure constant protective observation.

Specific monitoring criteria are not established for cold stress. However, employees should be thoroughly cognizant of the signs and symptoms of frostbite and hypothermia (see Table 1) in themselves as well as in coworkers. All instances of cold stress should be reported to the site safety coordinator. Work schedules may be adjusted and warm-up regimes imposed as needed to deal with temperature and wind conditions.

TETRA TECH, INC.

HEALTH AND SAFETY MANUAL

VOLUME III

SAFE WORK PRACTICES (SWP)

RESPIRATOR CLEANING PROCEDURES

SWP NO.: 6-27

ISSUE DATE: FEBRUARY 1999

REVISION: 0

RESPIRATOR CLEANING PROCEDURES

This safe work practice (SWP) provides guidelines for proper and thorough cleaning of respiratory protection equipment. The Occupational Safety and Health Administration (OSHA) regulates the use of respiratory protection for general industry in Title 29 of the *Code of Federal Regulations* (CFR) Part 1910.134, "Respiratory Protection." Appendix B-2 of the standard outlines mandatory requirements for respirator cleaning and is used as the basis for this SWP. This SWP supplements Document Control No. 2-6, "Respiratory Protection Program." It provides specific respirator cleaning and disinfection procedures and shall be included as an attachment to the site-specific health and safety plan for projects for which respirator use is planned or is a contingency.

1.0 APPLICABILITY

This SWP shall apply to any project that involves use of respirators with reusable facepieces.

Respirators shall be cleaned and disinfected as discussed below.

- Respirators issued for the exclusive use of an employee shall be cleaned and disinfected as often as necessary to be maintained in a sanitary condition.
- Respirators issued to more than one employee shall be cleaned and disinfected before being worn by different individuals.
- Respirators maintained for emergency use shall be cleaned and disinfected after each use.
- Respirators used in fit testing and training shall be cleaned and disinfected after each use.

2.0 CLEANING AND DISINFECTION PROCEDURES

Mandatory respirator cleaning procedures as defined in 29 CFR Part 1910.134, Appendix B-2, are listed below. All wash and rinse water should be warm, with a maximum temperature of 110 °F (43 °C).

1. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, and any other components as recommended by the manufacturer. Discard or repair any defective parts.

2. Wash components in warm water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.

3. Rinse components thoroughly in clean, warm, preferably running water. Drain all components.

4. When the cleaner does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:

   - Hypochlorite solution [50 parts per million (ppm) of chlorine] made by adding approximately one milliliter of laundry bleach to 1 liter of warm water

   - Aqueous solution of iodine [50 ppm iodine made by adding approximately 0.8 milliliter of tincture of iodine (6 to 8 grams ammonium and/or potassium iodide per 100 cubic centimeters of 45 percent alcohol) to 1 liter of warm water]

   - Other commercially available cleansers of equivalent disinfectant quality when used as directed if their use is recommended or approved by the respirator manufacturer

5. Rinse components thoroughly in clean, warm, preferably running water. Drain all components. The importance of thorough rinsing cannot be over emphasized. Detergents or disinfectants that dry on facepieces may cause dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.

6. Components should be air-dried or hand-dried with a clean, lint-free cloth.

7. Reassemble the facepiece. Replace filters, cartridges, and canisters prior to next use.

8. Test the respirator to ensure that all components work properly.

9. Place the respirator in a clean bag and seal for storage.

Depending on work conditions, respirator facial sealing surfaces may need periodic cleaning during the course of daily use. Cleaning of the facial sealing surface during work breaks can reduce the chance of facial irritation caused by sweat, natural skin oil, or irritating materials that may have deposited on the facepiece. Facial sealing surfaces can be cleaned using disinfectant wipes soaked in isopropyl alcohol or benzalkonium chloride. After use of the disinfectant wipe, the sealing surface should air dry or be dried thoroughly using paper towels or tissues.

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HEALTH AND SAFETY MANUAL
VOLUME III

SAFE WORK PRACTICES (SWP)

SAFE WORK PRACTICES FOR USE OF AIR PURIFYING RESPIRATORS

SWP NO.: 6-28

ISSUE DATE: FEBRUARY 1999

REVISION: 0

SAFE WORK PRACTICES FOR USE OF RESPIRATORS

This safe work practice (SWP) was developed to ensure the proper use of respirators in routine and foreseeable emergency situations. The SWP supplements Document Control No. 2-6, "Respiratory Protection Program." This SWP shall be included as an attachment to the site-specific health and safety plan (HASP) for projects for which respirator use is planned or is a contingency.

1.0 APPLICABILITY

This SWP shall apply to any project that involves use of air purifying respirators and shall not be used for situations involving the use of supplied air systems such as self-contained breathing apparatuses and air-line apparatuses.

2.0 ROUTINE RESPIRATOR USE PROCEDURES

The procedures below apply to the routine use of air purifying respirators.

- Respirators shall not be issued to or worn by individuals when conditions prevent valve function or a good facial seal. These conditions may include but are not limited to facial hair, such as the growth of beard, sideburns, or excessive mustaches, and possibly the wearing of corrective eyeglasses.
- If spectacles, goggles, face shields, or welding helmets must be worn with a facepiece, they will be worn so as not to adversely affect the seal of the facepiece to the face.
- For all tight-fitting respirators, a positive and negative pressure seal check shall be performed each time the respirator is donned. Seal checks shall be performed as follow:
  - *Negative pressure check:* Close off the inlet opening of the canister or cartridge(s) by covering it with the palm of the hand(s), inhale gently so that the facepiece collapses slightly, and hold the breath for 10 seconds. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is satisfactory.
  - *Positive pressure check*: Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. The exhalation valve cover may have to be removed to perform this procedure.

  - *Manufacturer's recommended seal check*: If the respirator manufacturer recommends specific procedures for performing a user seal check, these procedures may be used instead of the negative and positive pressure checks.

- Work areas must be monitored for conditions that may adversely affect the effectiveness of respiratory protection. Employees may leave the work area where respirators are required under the following conditions:
  - To wash the face and respirator facepieces as necessary to prevent eye or skin irritation
  - If vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece is detected
  - To replace the respirator or the filter, cartridge, or canister elements
  - If established monitoring instrument action levels are exceeded
  - For any other criteria as established in a project specific health and safety plan

3.0 RESPIRATOR USE DURING EMERGENCY SITUATIONS

Emergency situations may arise during the wearing of respiratory protection. These situations could include medical emergency, respirator failure, fire, chemical spills or leaks, and other events that pose an immediate risk. Procedures for respirator use during emergency situations are summarized below.

- When an emergency situation arises that creates or has the potential to create immediately dangerous to life and health (IDLH) conditions, the work environment shall be evacuated immediately and shall not be reentered by employees without suitable protective gear.
- Work environments with the potential for the development of atmospheres that may present IDLH conditions shall only be entered by employees using the buddy system.
- When an emergency situation arises that includes physical hazards that may interfere with the proper use of respiratory protection, the work environment shall be evacuated.
- Under no circumstances shall respirator users remove facepieces in hazardous atmospheres. In the event of respirator malfunction, users should leave the hazardous environment immediately and proceed to a known safe location before removal of the facepiece.

- Episodes of respirator failure shall be thoroughly investigated before work activities begin again. The investigation shall include re-evaluation of work area atmospheric conditions, review of the respirator selection criteria and service life calculations, and an evaluation of the working conditions under which respirator failure occurred.

TETRA TECH, INC.

HEALTH AND SAFETY MANUAL

VOLUME III

SAFE WORK PRACTICES (SWP)

RESPIRATOR QUALITATIVE FIT TESTING PROCEDURES

SWP NO.: 6-29

ISSUE DATE: APRIL 1999

REVISION NO.: 0

RESPIRATOR QUALITATIVE FIT TESTING PROCEDURES

The safe work practice (SWP) addresses the need for proper and thorough procedures for qualitative fit testing of respirators. The Occupational Safety and Health Administration (OSHA) regulates general industrial use of respiratory protection under Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.134. Appendix A of the standard outlines mandatory procedures to use for both qualitative fit tests (QLFT) and quantitative fit tests (QNFT). This SWP was written to meet the requirements of Appendix A for QLFTs. This SWP must be used in conjunction with the Tetra Tech, Inc. (Tetra Tech), "Respiratory Protection Program," Document Control No. 2-6.

The following sections describe the SWP's applicability, qualifications of fit testers, and fit testing procedures for use during QLFTs.

1.0 APPLICABILITY

This SWP applies to all Tetra Tech employees who use respirators on the job and to employees who conduct any fit testing. In addition, when a Tetra Tech company or office uses an outside service to perform fit testing, the organization conducting the fit testing shall meet the minimum requirements for QLFT and QNFT procedures specified in Appendix A of the standard.

Respirator fit testing shall be conducted at the following intervals:

- Prior to initial use of a respirator
- Whenever a different respirator facepiece (size, style, model, or make) is used
- At least annually thereafter
- After any reported or observed changes in an employee's physical condition that could affect respirator fit. This includes but is not limited to, facial scarring, dental changes, cosmetic surgery, or an obvious change in body weight.

If an employee notices that the fit of a respirator has become unacceptable, he or she will be given an opportunity to select another respirator facepiece.

2.0 QUALIFICATION OF FIT TESTERS

Tetra Tech employees who conduct QLFTs must demonstrate sufficient understanding and expertise in the required testing procedures. Fit testers shall qualify through appropriate education, experience, or both. Qualifications of fit testers shall be determined on a case-by-case basis by regional health and safety representatives (RHSR) or subsidiary health and safety representatives (SHSR) based on the fit tester's demonstrated knowledge of OSHA-mandated fit test procedures and performance of a simulated fit test. The RHSR or SHSR must ensure that persons administering fit tests are able to prepare test solutions, calibrate and operate equipment, perform tests properly, recognize invalid tests, and ensure that test equipment is in proper working order. The fit tester must also demonstrate how to clean and maintain equipment to operate within the parameters for which it was designed.

3.0 FIT TESTING PROCEDURES

Appendix A of 29 CFR 1910.134 provides instruction for five OSHA-accepted QLFT procedures. Tetra Tech has selected two of these procedures for its fit test program. The sections below describe general requirements that must be followed during all fit tests and for any fit test method used. Both the Bitrex™ and irritant smoke QLFT protocols are discussed below.

3.1 GENERAL REQUIREMENTS

QLFTs must be conducted in accordance with the general requirements discussed below.

- The test subject shall be shown how to put on a respirator, position it on the face, set strap tension, and determine an acceptable fit. A mirror shall be available to assist the subject in evaluating the fit and positioning the facepiece.
- The test subject must be allowed to choose from a sufficient selection of models and sizes to identify a respirator that fits correctly and is comfortable. The subject shall be informed that he or she is being asked to select the respirator that provides the most acceptable fit. The subject shall be asked to hold each chosen facepiece up to the face and eliminate those that obviously do not provide an acceptable fit.
- The subject shall don the most comfortable respirator and wear it for at least 5 minutes to assess comfort. If the subject is not familiar with a particular respirator, the subject shall be directed to don the mask several times and to adjust the straps each time to become adept at setting proper strap tension.

- The tester shall review the following points with the subject and allow the subject adequate time to determine the comfort of the respirator:
  - Position of the mask on the nose
  - Room for eye protection
  - Ability to talk
  - Position of the mask on the face and cheeks
- The following criteria shall be used to help determine the adequacy of the respirator fit:
  - Chin properly placed
  - Adequate strap tension (not overly tight)
  - Fit across nose bridge
  - Proper size to span distance from nose to chin
  - Tendency of respirator to slip
  - Self-observation in a mirror to evaluate fit and respirator position
- The subject shall conduct a user seal check using the negative- and positive-pressure seal check procedures described in Appendix A of this SWP. Before conducting the check, the subject shall be instructed to seat the mask on the face by moving the head from side to side and up and down slowly while taking a few slow, deep breaths. If the seal checks fail, the subject shall choose another facepiece.
- Seal checks and fit testing shall not be conducted if there is any facial hair growth such as stubble beard growth, beard, mustache, or sideburns that interferes with the facepiece sealing surface. Any interfering apparel shall be altered or removed.
- If the subject experiences difficulty in breathing during testing, the testing shall stop immediately and he or she shall be referred to a company physician for assessment.
- If the subject finds the fit of the respirator unacceptable, the subject shall be given the opportunity to select a different respirator and to be retested.
- Prior to commencement of the fit test, the subject shall be given a written description of the respirator user seal check procedures (see Appendix A) and exercises to perform during the testing. Exercises and a prepared text to be read during the test are included in Appendix B of this SWP.
- All exercises in Appendix B must be performed for all QLFT methods.

3.2 BITREX™ SOLUTION QUALITATIVE FIT TEST PROTOCOL

Bitrex™ solution (denatonium benzoate) is a taste aversion agent. To conduct a QLFT using Bitrex™, the test subject must first pass a taste threshold screening. The entire procedure must be explained to the test subject before the screening is conducted. The sections below describe taste threshold screening and fit test procedures. Particulate filters (cartridges) are used during this test.

3.2.1 Taste Threshold Screening

The taste threshold screening is intended to determine whether the individual tested can detect the taste of Bitrex™. The procedures below shall be used for the taste screening.

- Prior to testing, the tester shall prepare a quantity of threshold check solution by adding 13.5 milligrams (mg) of Bitrex™ to 100 milliliters (mL) of 5 percent salt solution in distilled water. A nebulizer for taste screening shall be clearly marked to distinguish it from the fit test solution nebulizer. The taste screening nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every 4 hours.

- During the taste screening as well as during the fit testing, subjects shall wear an enclosure around the head and shoulders that is approximately 12 inches in diameter by 14 inches tall. The front portion of the enclosure shall be clear from the respirator and allow free movement of the head when a respirator is worn. An enclosure substantially similar to the 3M hood assembly, parts #14 and #15 combined, is adequate.

- The test enclosure shall have a 0.75-inch hole in front of the test subject's nose and month area to accommodate the nebulizer nozzle.

- The test subject shall don the test enclosure. Throughout the threshold screening test, the test subject shall breathe through his or her slightly open mouth with tongue extended. The subject is instructed to report when he or she detects a bitter taste.

- Using a DeVilbiss Model 40 Inhalation Medication Nebulizer or equivalent, the test conductor shall spray the threshold check solution into the enclosure. To produce the aerosol, the nebulizer bulb is firmly squeezed so that the bulb collapses completely. The bulb is then released and allowed to fully expand. Correct use of the nebulizer means that approximately 1 mL of liquid is used at a time in the nebulizer body.

- The nebulizer should be rapidly squeezed 10 times and then the test subject is asked whether the Bitrex™ solution can be tasted. If the subject reports tasting the bitter taste during the 10 squeezes, the screening test is complete. The taste threshold is noted as 10 regardless of the number of squeezes actually completed.

- If the first response is negative, the nebulizer is rapidly squeezed 10 more times and the test subject is again asked whether the Bitrex™ solution is tasted. If the test subject reports tasting the bitter taste during the second 10 squeezes, the screening test is completed. The taste threshold is noted as 20 regardless of the number of squeezes actually completed.

- If the second response is negative, the nebulizer is rapidly squeezed 10 more times and the test subject is again asked whether the Bitrex™ solution is tasted. If the test subject reports tasting the bitter taste during the third 10 squeezes, the screening test is completed. The taste threshold is noted as 30 regardless of the number of squeezes actually completed.

- If the Bitrex™ solution is not tasted after 30 squeezes, the test subject is unable to taste the Bitrex™ solution and cannot be fit tested using the Bitrex™ solution test.

- The tester will note the number of squeezes required to solicit a taste response. When a taste response has been elicited, the test subject shall be asked to note the taste for reference in the fit test.

3.2.2 Bitrex™ Solution Fit Test Procedures

The procedures below must be followed to conduct the actual Bitrex™ solution fit test:

- A fit test solution is prepared by adding 337.5 mg of Bitrex™ to 200 mL of a 5 percent salt solution in warm water. A second nebulizer dedicated to fit testing shall be clearly marked to distinguish it from the taste screening solution nebulizer. The nebulizer shall be thoroughly rinsed in water, shaken to dry, and refilled at least each morning and afternoon or at least every 4 hours.

- The test subject shall be instructed not to each, drink, smoke, or chew gum for 15 minutes before the test.

- The person being fit tested shall don the respirator without assistance and perform the required user seal check (see Appendix A).

- The fit test uses the same enclosure described for taste threshold screening in Section 3.2.1. The test subject shall don the enclosure while wearing the respirator selected as described in the general requirements in Section 3.1. The respirator shall be properly adjusted and equipped with particulate filter(s).

- As before, the test subject shall breathe through his or her slightly opened mouth with tongue extended, and shall be instructed to report is he or she tastes the bitter taste of Bitrex™

- The nebulizer is inserted into the hole in front of the enclosure, and an initial concentration of the fit test solution is sprayed into the enclosure using the same number of squeezes (either 10, 20, or 30) based on the number of squeezes required to elicit taste response noted during the screening test.

- After generating the aerosol, the test subject shall be instructed to perform the test exercises provided in Appendix B.

- Every 30 seconds, the aerosol concentration shall be replenished using one half the number of squeezes used initially (such as 5, 10, or 15).

- The test subject shall indicate to the tester if at any time during the fit test the taste of Bitrex™ solution is detected. If the test subject does not report tasting the Bitrex™ solution, the test is passed.

- If the taste of Bitrex™ solution is detected, the fit is deemed unsatisfactory and the test is failed. A different respirator shall be tried, and the entire test procedure (screening and test) is repeated.

3.3 IRRITANT SMOKE (STANNIC CHLORIDE) QUALITATIVE FIT TEST PROTOCOL

This QLFT uses a person's response to irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator. To conduct this QLFT, the general requirements and precautions, a sensitivity screening check, and fit test procedures discussed below must be followed.

3.3.1 General Requirements and Precautions

General requirements and precautions related to the irritant smoke QLFT are discussed below.

- The respirator to be tested shall be equipped with high-efficiency particulate air (HEPA) or P100 series filter(s). Tetra Tech recommends that the person performing the fit test also wear a full-face respirator with HEPA or P100 series filters.

- Only stannic chloride smoke tubes shall be used for this protocol.

- No test enclosure or hood for the test subject shall be used.

- The smoke can irritate the eyes, lungs, and nasal passages. The test conductor shall take precautions to minimize the test subject's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that only the minimum amount of smoke is used necessary to elicit a response from the test subject.

- The fit test shall be performed in an area with adequate ventilation to prevent exposure of the person conducting the fit test or buildup of irritant smoke in the general atmosphere.

3.3.2 Sensitivity Screening Check

The person to be tested must demonstrate his or her ability to detect a weak concentration of the irritant smoke as discussed below.

- The tester shall break both ends of a ventilation smoke tube containing stannic chloride and attach one end of the smoke tube to (1) a low-flow air pump set to deliver 200 mL per minute or (2) an aspirator squeeze bulb. The test operator shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.

- The test operator shall advise the test subject that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct the subject to keep his or her eyes closed while the test is performed.

- The test subject shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he or she can detect the irritating properties of the smoke. The test operator shall carefully direct a small amount of the irritant smoke in the test subject's direction to determine if he or she can detect it.

3.3.3 Irritant Smoke Fit Test Procedures

The procedures below must be followed to conduct the actual irritant smoke fit test.

- The person being fit tested shall don the respirator without assistance and perform the required user seal check (see Appendix A).

- The test subject shall be instructed to keep his or her eyes closed.

- The tester shall direct the stream of irritant smoke from the smoke tube toward the face seal area of the test subject using the low-flow pump or squeeze bulb at least 12 inches from the facepiece. The tester shall move the smoke stream around the whole perimeter of the mask. The tester shall gradually make two more passes around the perimeter of the mask, moving to within 6 inches of the respirator.

- If the person being tested does not have an involuntary response or detect the irritant smoke, the test should proceed with the test exercises provided in Appendix B.

- The test exercises shall be performed by the test subject while the respirator seal is being continually challenged by the smoke around the perimeter of the respirator at a distance of 6 inches.

- If the person being fit tested reports detecting the irritant smoke at any time, the fit test is failed. The person being retested must repeat the entire sensitivity check and fit test procedure.

- Each test subject passing the irritant smoke test without evidence of a response is required to undergo a second sensitivity screening check after the respirator has been removed using the smoke from the same smoke tube used during the fit test to determine whether he or she still reacts to the smoke. Failure to evoke a response shall render the fit test void. If the subject responds during the second sensitivity check, the fit test is passed.

APPENDIX A

RESPIRATOR USER SEAL CHECK PROCEDURES

APPENDIX A

RESPIRATOR USER SEAL CHECK PROCEDURE

Individuals using tight-fitting respirators must perform a user seal check each time a respirator is put on to ensure that an adequate seal is achieved. Two methods are available for use; one is the positive- and negative-pressure check and the other is the respirator manufacturer's method. Either the positive- and negative-pressure checks described below may be used or, if a manufacturer of a particular respirator brand has developed its own recommended seal check method, that method may be used in place of the negative- and positive-pressure seal checks. User seal checks are not a substitute for qualitative or quantitative fit tests. The user check procedures described below are as described in the mandatory Appendix B-1 of Title 29 of the *Code of Federal Regulations*, Part 1910.134.

- Positive-Pressure Check

  Close off the exhalation valve and exhale gently into the facepiece. The face fit is considered satisfactory if a slight positive pressure can be built up inside the facepiece without any evidence of outward leakage of air at the seal. For most respirators, this method of leak testing requires the wearer to first remove the exhalation valve cover before closing off the exhalation valve and then carefully replace it after the test.

- Negative-Pressure Check

  Close off the inlet opening(s) of the canister or cartridge(s) by covering the opening with the palm of the hand(s) or by replacing the filter seal(s). Inhale gently so that the facepiece collapses slightly, and hold the breath for 10 seconds. The inlet opening of some cartridges cannot be effectively covered with the palm of the hand. In this case, the test can be performed by covering the inlet opening of the cartridge with a thin latex or nitrile glove. If the facepiece remains in its slightly collapsed condition and no inward leakage of air is detected, the tightness of the respirator is considered satisfactory.

APPENDIX B

RESPIRATOR FIT TEST EXERCISES

RESPIRATOR FIT TEST EXERCISES

Test subjects shall perform the exercises below during fit test process. Prior to the actual fit test, the test subject shall (1) select a suitable and comfortable respirator; (2) don, adjust, and then wear the respirator for 5 minutes to assess comfort; (3) conduct a user seal check in accordance with the procedures outlined in Appendix A, (4) report any difficulties breathing while wearing the respirator, (5) select a different respirator if the fit and level of comfort is unacceptable, and (6) perform the fit test exercises described below in the order listed. The qualitative fit test (QLFT) shall be performed in a test environment.

Test Exercises

Each exercises below shall be conducted for 1 minute. During testing, the subject will be questioned and observed to determine if the respirator is comfortable. The respirator shall not be adjusted during the fit testing procedure. Any adjustment voids the test, and the test must be repeated from the beginning.

1. **Normal breathing.** In a normal standing position without talking, breathe normally.
2. **Deep breathing.** In a normal standing position, breathe slowly and deeply. Be careful not to hyperventilate.
3. **Turning head from side to side.** Standing in place, slowly turn the head from side to side between the extreme positions on each side. Hold the head at each extreme momentarily and inhale at each side.
4. **Moving head up and down**. Standing in place, slowly move the head up and down. Inhale in the up position (such as when looking toward the ceiling).
5. **Talking.** Talk out loud slowly and loud enough to be heard clearly by the fit tester. Read the entire "Rainbow Passage" on the next page.
6. **Bending over.** Bend at the waist as if to touch the toes.
7. **Normal breathing.** Complete the same exercise as item 1 above.

After these test exercises are completed, the tester shall ask the test subject about the comfort of the respirator. If the respirator is uncomfortable, another respirator shall be tried and the fit test, as well as user check and screening procedures, will be repeated.

RAINBOW PASSAGE

"When the sunlight strikes raindrops in the air, they act like a prism and form a rainbow. The rainbow is a division of white light into many beautiful colors. These take the shape of a long round arch, with its path high above, and its two ends apparently beyond the horizon. There is, according to legend, a boiling pot of gold at one end. People look, but no one ever finds it. When a man looks for something beyond reach, his friends say he is looking for the pot of gold at the end of the rainbow."

Source: Appendix A of Title 29 of the *Code of Federal Regulations,* Part 1910.134

Project Specific Guidance
Completion of Field Sample Data Sheets (FSDS)

Project: Libby Asbestos Remedial Investigation – Remedial Investigation (RI)

Project No.: 3282-137

Document No.: CDM-LIBBY-03 Revision 1

Prepared by: Dee A. Warren Date: 4/17/03

Approved by: ______________________________
Project Manager Date

____
Technical Reviewer Date

____
QA Reviewer Date

____
EPA Approval Date

A field sample data sheet (FSDS) must be completed using the following guidance.

Definitions:

Owner – (As it appears on the property IFF). Person who owns a residential property (may or may not be the current occupant), or the person who owns a commercial property.

Sample Coordinator – person responsible for the custody of all field paper work and samples collected

Soil Field Sample Data Sheet

Sheet No.: Pre-assigned unique sequential sheet number. Completed by sample coordinator.

Scenario No.: Scenario numbers are specific to the Phase II sampling program and do not apply to the RI. "NA" should be placed in this blank.

Field Logbook No.: The logbook number being used to record information specific to the samples on the FSDS.

Page No.: Page number in logbook on which information regarding the samples on the FSDS is recorded.

Sampling Date: Date samples are collected, in the form MM/DD/YY.

Address: (As it appears on the property IFF). The address of the property being sampled. Addresses are to be entered in the following format:

Street number – Direction – Street Name – Street Abbreviation

Where:
Street number = the number of the street address
Direction = the abbreviation of the street direction (N, S, E, or W), when applicable
Street name = correct spelling of the street name
Street abbreviation = when applicable

Road – Rd
Avenue – Ave
Street – St
Circle – Cr
Place – Pl
Boulevard – Blvd
Highway - Hwy

Examples:
510 N Mineral Ave
607 N Michigan Ave
521 Pipe Creek Rd

Business Name: (As it appears on the property IFF). If a business is located on the property, record the name. If a business is not located on the property, record NA.

Owner: (As it appears on the property IFF). Name of the property owner (not necessarily the current occupant).

Land Use: Description of land use on which property is located.

Sampling Team: Company affiliation of sampling team.

Names: Full name of all members of the sampling team.

Index ID: Sample identification (ID) number. Index ID numbers for the RI soil samples are in the form CS-#####. A set of available numbers is assigned to each sampling team by the sample coordinator.

Location ID: Unique identification number assigned to each sample location with a unique global positioning system (GPS) coordinate. For soil samples, location identifications (IDs) are in the form SP-#####. A set of available numbers is assigned to each sampling team by the sample coordinator.

Sample Group: The sample group for soil samples collected for the RI must be one of the following options:

Yard	Flower Bed
Garden	Field
Driveway	Walkway
Road	Park

Location Description: Description of the location where a soil sample was collected. If back yard, front yard, side yard, or driveway does not apply, use the other blank. If the yard sample was composed of sub-samples located in more than one yard location, circle all that apply.

Category: FS = field sample; FD = field duplicate; and FB = field blank. The field duplicate blank should be used to identify the FD of the parent FS.

Matrix Type: The samples collected for the RI will mostly be surface samples (0 to 1 or 0 to 6 inches). If a sample that is collected is not a surface sample, complete the other line using the following options: mining waste, subsurface soil, fill.

Type: Indicate the type of sample collected, grab or composite. If the sample is a composite sample, the number of sub-samples must be provided.

Time: The time of sample collection, in military time.

Top Depth: Top depth of sample in inches below the ground surface.

Bottom Depth: Bottom depth of sample in inches below the ground surface.

Field Comments: Any information specific to a sample. If vermiculite is present, this must be noted in the field comments section.

Entered: Completed by Volpe personnel at time of data entry.

Validated: Completed by Volpe personnel at time of data entry check.

Completed by: Initials of field team member that completes the FSDS.

QC by: Initials of field team member that completes QC check of FSDS.

Dust Field Sample Data Sheet

Sheet No.: Pre-assigned unique sequential sheet number. Completed by sample coordinator.

Scenario No.: Scenario numbers are specific to the Phase II sampling program and do not apply to the RI. "NA" should be placed in this blank.

Field Logbook No.: The logbook number being used to record information specific to the samples on the FSDS.

Page No.: Page number in logbook on which information regarding the samples on the FSDS is recorded.

Sampling Date: Date samples are collected, in the form MM/DD/YY.

Address: (As it appears on the property IFF). The address of the property being sampled. Addresses are to be entered in the following format:

Street number – Direction – Street Name – Street Abbreviation

Where:
Street number = the number of the street address
Direction = the abbreviation of the street direction (N, S, E, or W), when applicable
Street name = correct spelling of the street name
Street abbreviation = when applicable
Road – Rd
Avenue – Ave
Street – St
Circle – Cr
Place – Pl
Boulevard – Blvd
Highway - Hwy

Examples: 510 N Mineral Ave
607 N Michigan Ave
521 Pipe Creek Rd

Business Name: (As it appears on the property IFF). If a business is located on the property, record the name. If a business is not located on the property, record NA.

Owner: (As it appears on the property IFF). Name of the property owner (not necessarily the current occupant).

Land Use: Description of land use on which property is located.

Sampling Team: Company affiliation of sampling team.
Names: Full name of all members of the sampling team.

Index ID: Sample identification (ID) number. Index ID numbers for the RI dust samples are in the form 1-#####. A set of available numbers is assigned to each sampling team by the sample coordinator.

Location ID: Unique identification number assigned to each sample location with a unique global positioning system (GPS) coordinate. For dust samples, location identifications (IDs) are in the form BD-#####. The location ID for dust samples is the BD number of the structure the dust sample is collected in. A set of available numbers is assigned to each sampling team by the sample coordinator.

Matrix Type: Circle the structure type in which the sample is collected. If the best description of the structure is not an option, right a description in the blank provided.

Sample Group: Circle the floor/level the dust sample was collected on. If the best description of the floor/level is not an option, right a description in the blank provided.

Location Description: Circle the location the dust sample was collected per the dust sampling protocol. Circle all locations that apply to the sample. If the best description of the location is not an option, right a description in the blank provided.

Category: FS = field sample or blank. It the cassette was used to collect a sample, circle FS. If the cassette will be submitted as a blank, circle blank.

Sample Area: Circle the amount of area sampled with the cassette.

Filter Diameter: Circle the appropriate filter diameter.

Pore Size: Circle the appropriate pore size.

Flow Meter Type: Circle the type of flow meter used to calibrate the pump flow rate.

Flow Meter ID No.: Record the identification number of the flow meter used to calibrate the pump flow rate.

Pump ID No.: Record the identification number of the pump used to collect the sample.

Start Time: Record the starting time of each sample aliquot collection, in military time.

Start Flow: Record the starting pump flow rate for the sample colleted in Liters per minute (L/min).

Stop Time: Record the stopping time of each sample aliquot collection, in military time.

Stop Flow: Record the stopping pump flow rate for the sample colleted in minute L/min.
Pump Fault: If the pump faulted during sample collection, circle Yes. If the pump did not fault during sample collection, circle No.

Field Comments: For each 100cm2 aliquot locations, record the specific location sampled.

Entered: Completed by Volpe personnel at time of data entry.

Validated: Completed by Volpe personnel at time of data entry check.

Completed by: Initials of field team member that completes the FSDS.

QC by: Initials of field team member that completes QC check of FSDS.

Project Specific Guidance
Completion of Information Field Form (IFF)

Project: Libby Asbestos Remedial Investigation - Contaminant Screening Study (CSS)

Project No.: 3282-137

Document No.: CDM-LIBBY-04 Revision 1

Prepared by:	Dee Warren Project Scientist	4/21/03 Date
Approved by:	Project Manager	Date
	Technical Reviewer	Date
	QA Reviewer	Date
	EPA Approval	Date

An information field form (IFF) is to be completed for each structure located on a property. Three IFFs will be used: (1) primary structure and property assessment information field form (Primary IFF), (2) secondary structure information field form (Secondary IFF), and (3) primary structure and property assessment supplemental information field form (SIFF). The IFFs are completed from both interviews with the occupant/owner and visual inspection of the structures and surrounding properties and are used to facilitate the information-gathering process (interview and visual inspection) of properties during the contaminant screening study (CSS).

Definitions:

Primary structure – Refers to the main inhabitable structure on a property or the main commercial structure on a property.

Secondary structure – Refers to structures other than the primary structure located on a property (i.e., shed, barn, detached garage with an attic, etc.). Attached garages are considered part of the primary structure.

Occupant – Refers to the person currently living in a primary residential structure.

Owner – Refers to the person who owns a residential property (may or may not be the current occupant) or person who owns a commercial property.

Each entry on the IFF should be completed following the guidance procedure, and any notes on each item should be written in the notes column to the right of each data item. The IFF type the item refers to is shown following the description of the data to be entered.

Header Information

BD#: Refers to the location identification (ID) number of the structure the IFF is being completed for. The field team obtains a list of available numbers from the sample coordinator. The building number is the unique identification number of the building where the information was collected. For apartment buildings or commercial building with more than one occupant, an IFF will be completed for each occupant. The BD number placed on each IFF will be the BD number unique to that entire building. The apartment or suite number for which the IFF is being completed will be placed in the structure description field of the IFF. For trailer parks where there are multiple structures on the same property, each will be given a unique BD number and the lot number will be placed in the address (e.g., 576 Reese Ct #33). (Primary IFF, Secondary IFF, SIFF)

Phase I Background IFF (BIFF) No.: Refers to the BIFF number completed during phase I dust sampling. (SIFF)

Soil samples collected: Provide the date of CSS soil sample collection. This item is to be completed at the time of soil sample collection. (Primary IFF, Secondary IFF, SIFF)

Field Logbook No.: The number of the field logbook that is used to record information specific to the property being assessed on the IFF. (Primary IFF, Secondary IFF, SIFF)

Page No.: The page numbers in the logbook that contain information specific to the property being assessed on the IFF. (Primary IFF, Secondary IFF, SIFF)

Site Visit Date: Date of site visit, in the form MM/DD/YY. (Primary IFF, Secondary IFF, SIFF)

Address: The address of the property being assessed on the IFF. Addresses are to be entered in the following format detailed below. (Primary IFF, Secondary IFF, SIFF)

Street number – Direction – Street Name – Street Abbreviation

Where:

Street number = the number of the street address
Direction = the abbreviation of the street direction (N, S, E, or W), when applicable
Street name = correct spelling of the street name
Street abbreviation = when applicable

Road – Rd

Avenue – Ave
Street – St
Circle – Cr
Place – Pl
Boulevard – Blvd
Highway - Hwy

Examples: 510 N Mineral Ave
1616 Rainy Creek Rd
521 Pipe Creek Rd

Structure Description: Description of the structure specific to the IFF (i.e., house, trailer, garage, shed, barn). (Primary IFF, Secondary IFF, SIFF)

Occupant: Name of current occupants of the primary structure. In the case of a commercial property, the occupant information would not be completed. (Primary IFF, Secondary IFF, SIFF)

Occupant Phone Number: Phone number of occupant of the primary structure. (Primary IFF, Secondary IFF, SIFF)

Owner: Only needs to be completed if the owner of the structure or property is different than the current occupant (i.e., renter). Required for commercial properties. (Primary IFF, Secondary IFF, SIFF)

Owner Phone Number: Phone number of the owner of the property. For residential properties, only complete if the owner is different than the current occupant. Required for commercial properties. (Primary IFF, Secondary IFF, SIFF)

Business Name: Name of business located on property. (Primary IFF, Secondary IFF, SIFF)

Sampling Team: Full name and company of each member of the team assessing the property (i.e., members sampling and/or completing IFF). (Primary IFF, Secondary IFF, SIFF)

Field Form Check Completed by (100% of forms): To be signed, after IFF is checked by the field team member not completing the IFF. (Primary IFF, Secondary IFF, SIFF)

Screening Field check Completed by (2% of forms): To be signed, after IFF is checked by the CSS task leader. (Primary IFF, Secondary IFF, SIFF)

House Attributes

Property Description: Description of the property specific to the IFF being completed. Indicate all that apply. (Primary IFF, Secondary IFF)

Surrounding Land Use: Description of the land use groups surrounding the property specific to the IFF being completed. Indicate all that apply. (Primary IFF, Secondary IFF)

Year of Construction: Year structure was constructed. If occupant and/or owner do not know what year the structure was complete, choose unknown. (Primary IFF, Secondary IFF)

Square Footage: Calculated from the field diagram or estimated from occupant/owner interview. (Primary IFF, Secondary IFF)

Construction Material: Material structure is constructed from. If other than wood, masonry, or stone, choose other and provide a description. (Primary IFF, Secondary IFF)

Number of Floors Above Ground: Number of floors above ground specific to the structure that is assessed on the IFF. If other than 1, 2, or 3, provide number of floors in blank. The number of floors above ground should include the attic only if it is used as a living space. (Primary IFF, Secondary IFF)

Number of Rooms Per Floor Above Ground: Number of rooms per floor that is above ground. Enter number of rooms per floor next to the floor number. If more than three floors are present, provide the information on the blank. (Primary IFF, Secondary IFF)

Basement: If a basement is present, choose yes. If a basement is not present, choose no. Basement refers to a room below ground level that a person can enter and stand upright (i.e., a crawl space is not a basement). (Primary IFF, Secondary IFF)

Heating Source: Method by which heat is produced in the structure. If a method other than wood/coal, electric, or propane/gas is used as a heating source, choose other and provide a description. (Primary IFF, Secondary IFF)

Heat Distribution: Method by which heat is distributed throughout the structure. Occupant and/or owner should be able to provide this information. (Primary IFF, Secondary IFF)

Was the residence/building remodeled? Provide yes or no as an answer. If yes, provide years since remodeling and location of remodeling. If occupant/owner is unsure, provide a note in the provided space. (Primary IFF, Secondary IFF)

Has resident/business purchased any Libby vermiculite materials from W.R. Grace in the past? Based on occupant/owner interview. Provide yes or no as an answer. If occupant/owner is unsure, provide a note in the provided space. (Primary IFF)

Has the property at this location been used for a for-profit enterprise of distributing, treating, storing, or disposing of Libby vermiculite? Based on occupant/owner interview. Provide yes or no as an answer. If occupant/owner is unsure, provide a note in the provided space. (Primary IFF)

CSS Assessment

Occupant Information: Provide date verbal interview is completed. (Primary IFF, Secondary IFF, SIFF)

Is there any knowledge of former miners, close relatives of miners, or any highly exposed persons living or visiting the property? Circle the answer that applies based on the verbal interview. If the answer is unknown, state why in the comments section. (Primary IFF, Secondary IFF, SIFF)

Is the resident, past or present, diagnosed with an asbestos-related disease? Circle the answer that applies based on the verbal interview. If the answer is unknown, state why in the comments section. (Primary IFF, Secondary IFF, SIFF)

Indoor Information: Provide date indoor visual inspection was completed. (Primary IFF, Secondary IFF, SIFF)

Does the interior have vermiculite attic insulation? Circle the answer that applies based on the visual inspection. If the answer is unknown, state why in the comments section. (Primary IFF, Secondary IFF, SIFF)

Did the interior ever have vermiculite attic insulation? Circle the answer that applies based on the visual inspection and verbal interview. If the answer is unknown, state why in the comments section. NA applies if the attic currently has VCI. (Primary IFF, Secondary IFF, SIFF)

Are there vermiculite additives in any of the building materials? Circle the answer that applies based on the visual inspection and verbal interview. If vermiculite was used as an additive, provide the type of material and its location. If the answer is unknown, state why in the comments section. (Primary IFF, Secondary IFF, SIFF)

Location of indoor vermiculite: Circle all locations where indoor vermiculite was observed. If the best description of the location is not listed, provide a description in the space provided. If vermiculite is observed in the living space, circle the location (floor of structure) the vermiculite was observed on and provide the specific location in the area provided (i.e., first floor bathroom). (Primary IFF, Secondary IFF, SIFF)

Outdoor Information: Provide date outdoor visual inspection was completed. (Primary IFF, Secondary IFF, SIFF)

Location of outdoor vermiculite: Circle all locations where outdoor vermiculite was observed. If the best description of the location is not list, provide a description in the space provided. (Primary IFF, Secondary IFF, SIFF)

Overall Assessment: Provide date verbal interview, indoor visual inspection, outdoor visual inspection was completed. (Primary IFF, SIFF)

Are primary source materials present at the property? Circle the answer that applies based on the visual inspection and verbal interview. Vermiculite in secondary structures should be included in this answer. (Primary IFF, SIFF)

Where are primary source materials located? Circle the answer that applies based on the visual inspection and verbal interview. Vermiculite in secondary structures should be included in this answer. NA applies if no primary source materials are located at the property. (Primary IFF, SIFF)

Additional Information

Any information concerning the presence of sources that are identified in the occupant/owner interview and any partial access or sample collection issues. On Primary IFFs, indicate which secondary structures are present on the property and do not contain vermiculite. (Primary IFF, Secondary IFF, SIFF)

Field Diagram of Property

To include location of all important features (i.e., drainage, trees, structures, flowerbeds, utility poles, known underground utilities, suspected Libby amphibole source areas, sample locations, etc.). A north arrow and location of streets adjacent to the property should also be included. (Primary IFF, SIFF)

Site-Specific Standard Operating Procedure for Soil Sample Collection

SOP No: CDM-LIBBY-05 Revision 1

Project: Libby Asbestos Remedial Investigation – Contaminant Screening Study (CSS)/Remedial Investigation (RI)

Project Number: 3282-137

Prepared by:	Thomas E. Cook Environmental Scientist	4/3/02 Date
	Dee A. Warren, Revision 1 Project Scientist	4/17/03 Date
Approved by:	____________________ Project Manager	 Date
	____________________ Technical Reviewer	 Date
	____________________ QA Reviewer	 Date
	____________________ EPA Approval	 Date

Section 1
Purpose

The purpose of this standard operating procedure (SOP) is to provide a standardized method for surface soil sampling to be used by employees of EPA Region VIII contractors/subcontractors supporting EPA Region VIII CSS and RI activities for the Libby Asbestos Project in Libby, Montana. This SOP describes the equipment and operations used for sampling surface soils in residential areas, which will be submitted for the analysis of Libby amphiboles. The EPA Region VIII remedial project manager, or on-scene coordinator must approve site-specific deviations from the procedures outlined in this document prior to initiation of the sampling activity. This SOP provides the protocols for composite surface-soil sampling.

Section 2
Responsibilities

Successful execution of the sampling and analysis plan (SAP) requires a clear hierarchy of assigned roles with different sets of responsibilities associated with each role.

The CSS/RI task leader is responsible for overseeing the CSS/RI residential surface soil sampling activities. The CSS/RI task leader is also responsible for checking all work performed and verifying that the work satisfies the specific tasks outlined by this SOP and the SAP. It is the responsibility of the CSS/RI task leader to communicate with the field personnel specific collection objectives and anticipate situations that require any deviation from the SAP. It is also the responsibility of the CSS/RI task leader to communicate the need for any deviations from the SAP with the appropriate EPA Region VIII personnel (remedial project manager or on-scene coordinator).

Field personnel performing soil sampling are responsible for adhering to the applicable tasks outlined in this procedure while collecting samples at residences. The field personnel should have limited discretion with regard to collection procedures but should exercise judgment regarding the exact location of the sample point, within the boundaries outlined by the CSS/RI task leader.

Section 3
Equipment

- Sample container - The sample container will consist of quart-sized zip-top plastic bags (2 per sample).
- Trowel - For collecting surface soil samples.
- Bulb planter - For collecting surface soil samples.
- Shovel - For collecting surface soil samples.
- Stainless steel mixing bowl - Used to mix and homogenize composite soil samples after collection.
- Gloves - For personal protection and to prevent cross-contamination of samples. May be plastic or latex. Disposable, powderless.
- Field clothing and personal protective equipment (PPE) - As specified in the health and safety plan (HASP).
- Field sprayers - For decontaminating nondisposable sampling equipment between samples will be used.
- Silica sand - For field equipment blank quality control (QC) samples.
- Wipes - Disposable, paper. Used to clean and decontaminate sampling equipment.
- Field logbook -Used to record progress of sampling effort and record any problems and field observations.

- Information Field Forms (IFF) - Used to record information such as property detail, location of amphibole contamination, and estimated quantities.
- Field Sample Data Sheet (FSDS) - Used to record soil sample information.
- Permanent marking pen - Used to label sample containers.
- Index ID stickers - Used to label sample containers.
- Plastic buckets - Used to wash nondisposable field equipment between samples.
- Trash bag - Used to dispose gloves and wipes.
- Cooler - Used to store samples while in the field.
- Chain of Custody Record - For ensuring custody of samples until shipping.
- Custody Seals - For ensuring custody of samples during shipping.

Section 4
Sampling Pattern

Each property will be segregated into land use areas for sampling purposes. Use areas may include but not be limited to:

- Yard (grassy area)
- Landscaped area
- Garden
- Fill area
- Driveway

Properties with grassy areas greater than ½ acre in size will be sectioned off into separate zones for increased accuracy in characterization. Sectioning properties into additional zones will be at the discretion of the CDM field team leader but consistent among the teams. This segregation will be accomplished so that a five-point composite sample will characterize the section. A five-point composite sample will be collected for land areas less than or equal to 1/8 of an acre.

Up to five composite soil samples will be collected at each property. Composite sampling requires soil collection from multiple (sub-sample) points. Composite samples will be collected from similar land use areas (i.e., yard, garden, stockpiled soil, etc.). Additional composite or grab samples may be collected dependent upon site conditions (i.e., multiple land use areas, zones, etc.). Conversely, not all land areas previously mentioned will be applicable at every property and fewer (not less than two) will be collected.

For non-disturbed areas (i.e., yard), composite samples will be collected from 0 to 1 inch (in.). For disturbed areas (i.e., driveway garden, fill area, landscaped areas, etc.), composite samples will be collected from 0 to 6 in. All composite soils samples will have five subsamples (i.e., five-point composite sample) of approximately equal size.

If vermiculite is observed in large land use areas (driveway and yards), one sample should be collected from each area. Any other land use areas where vermiculite product is visible will not be sampled. Instead, the location will be recorded in the field logbook and on the IFF.

Section 5
Sample Collection

Don the appropriate PPE as specified in the HASP. A new pair of plastic gloves are to be worn for each sample collected. Segregate land use areas on the property as described in Section 4. Visually inspect each land use area for visual vermiculite product. To reduce dust generation during sampling, use a sprayer with deionized water to wet each sample point prior to collection. Use the trowel to check beneath the surface soil layer, but do not advance more than 6 in. If visible vermiculite is observed, record information in the appropriate field forms and do not collect a sample from that land use area. If visible vermiculite is not observed, proceed with sample collection.

Within each land use area, select five subsample locations equidistant from each other. These five subsample locations will comprise the five-point composite sample for that land use area. All composite subsamples will originate from the same land use area. For example, do not mix subsamples from garden areas with subsamples from grassy areas.

Clean the subsample locations of twigs, leaves, and other vegetative material that can be easily removed by hand. Using the trowel, excavate a hole in the soil approximately 2 in. in diameter and 1 in. deep (6 in. for disturbed areas) while placing the excavated material directly inside the mixing bowl. The sides of the excavated hole should be close to vertical to avoid sampling that is biased in favor of the upper layer of soil. Repeat this step for each subsequent subsample until the appropriate number of composite subsamples has been collected.

Homogenize the sample using the sampling trowel. Once the sample is homogenized, fill the zip-top plastic bag to 1/3rd full (approximately 2000 grams). Affix the sample index identification (ID) sticker to the inside of the bag and write the index ID number on the outside of the bag. Double bag the sample and repeat the labeling process for the outer bag. Decontaminate equipment between composite samples as described in Section 8.

Repeat steps outlined above until all samples from a property have been collected.

Soil field duplicate samples will be collected at a rate of 1 per 20 (5 percent) of the field samples. Field duplicate samples will be collected as samples co-located in the same land use area. The duplicate will be collected from the same number of subsamples as the parent sample, but the subsample locations of the duplicate sample will be randomly located in the use area. These samples will be independently collected with separate sampling equipment. These samples will be used to determine the variability of sample results in a given land use are. These samples will not be used to determine variability in sampling techniques.

Section 6
Site Cleanup

Specific instruction regarding site cleanup of investigation-derived waste (IDW) is included in CDM SOP 2-2, Guide to Handling Investigation-Derived Waste, with modification. In general, replace soil plug with excess sample volume. The soil should be placed back into the hole and tamped down lightly. If sandy areas such as playgrounds are sampled, refilling the soil plug is not necessary.

Rinse water, the roots of vegetation removed during sampling, and any excess soil volume may be disposed of on the ground as specified in the SAP.

Section 7
Record Keeping and Quality Control

A field logbook should be maintained by each individual or team that is collecting samples as described in the SAP. The SAP will detail specific conditions (SOP 4-1), which require attention, but at a minimum the following information should be collected:

- Date
- Time
- Team members
- Weather conditions
- PPE used
- Locations of any samples and subsamples that could not be acquired
- Descriptions of any deviations to the SAP and the reason for the deviation

Complete the IFF and FSDS for each property/sample.

Quality control samples will include:

- Field duplicates
- Equipment blank samples

Detailed information on QC sample collection and frequency is included in the SAP.

Section 8
Decontamination

All sampling equipment must be decontaminated prior to reuse. Specific instructions on sample equipment decontamination are included in CDM SOP 4-5, Field Equipment Decontamination at Nonradioactive Sites, with modification. In general, the procedure to decontaminate all equipment is outlined below:

Decontamination procedures for soil sampling equipment will follow these steps:

- Remove all gross contamination with plastic brush
- Use DI water and a plastic brush to wash each piece of equipment
- Remove excess water present on the equipment by shaking
- Use a paper towel to dry each piece of equipment
- Wrap dried equipment in aluminum foil

Once a week all soil sampling equipment will be cleaning using Alconox and DI water.

Spent wipes, gloves, and PPE must be disposed or stored properly as specified in the SAP.

Section 9
Glossary

<u>Sampling and Analysis Plan (SAP)</u> - The written document that spells out the detailed site-specific procedures to be followed by the project leader and the field personnel.

<u>Sample Point</u> - The actual location at which the sample is taken. The dimension of a sample point is 2 in. across by 1 in. deep (6 in. for disturbed areas).

<u>Composite Sampling</u> - A sample program in which multiple sample points are compiled together and submitted for analysis as a single sample.

<u>Land Use Area</u> - A section of property segregated by how the property owner uses the section. For example, garden landscaped areas are individual land use areas. Grassy areas (i.e., lawn) are also considered to be a separate land use area.

TROY ASBESTOS PROPERTY EVALUATION
SOIL SAMPLING AND VISUAL ESTIMATION OF VERMICULITE
GUIDANCE, VERSION 01

The following soil sampling and visual estimation of vermiculite procedures were developed to make the Troy Asbestos Property Evaluation Project compatible with the Libby Asbestos Project Site-Specific Standard Operating Procedure for Semi-Quantitative Visual Estimation of Vermiculite in Soil (VEVS-SOP). The following sections define the definition and types of exterior use areas, procedures for sampling and visual estimation of vermiculite (Libby Amphibole [LA]) to be applied to each exterior use area, and procedures used to record the data.

1.0 LAND USE AREAS

The exterior use areas at Troy where soil samples will be collected include Specific Use Areas (SUA), Common Use Areas (CUA), Limited Use Areas (LUA), and Non-use Areas (NUA). The procedures for sampling and visual estimation will also be applied to Interior Surface (IS) zones of bare soil within structures. The definition of each exterior and interior use area to be inspected and sampled is presented below.

Specific Use Areas (Labeled SUA) – Discrete exterior parcels on a property with a designated specific use. Due to the nature of activities typically carried out in SUAs, residents may be especially vulnerable to exposures when LA-contaminated soil becomes airborne. SUAs may be bare or covered with varying amounts of vegetation. SUAs previously identified at the Libby Site and likely to occur at Troy include:

- Flower Pot
- Flowerbed
- Former Flowerbed
- Garden
- Former Garden
- Stockpile
- Play Area
- Dog Pen

Common Use Areas (Labeled CUA) – Exterior parcels on a property with varied or generic use. CUAs may be bare or covered with varying amounts of vegetation. CUAs previously identified at the Libby Site and likely to occur at Troy include:

- Driveway
- Parking Lot
- Road
- Walkway
- Yard (front, back, side, etc.)

Limited Use Areas (Labeled LUA) – Exterior parcels on a property that are accessed, utilized, and maintained on a very limited basis. LUAs may be bare or covered with varying amounts of vegetation. LUAs likely to occur at the Troy site include:

- Pasture/Field
- Maintained/Mowed Fields
- Overgrown Areas (with trails/footpaths, or between SUAs/CUAs)

Non-use Areas (Labeled NUA) – Exterior parcels on a property with no current use (e.g., areas that are un-maintained and not accessed). NUAs may be bare or covered with varying amounts of vegetation. NUAs likely to occur at the Troy site include:

- Wooded Lot
- Un-maintained Fields

Interior Surface Zones (Labeled IS) – Soil surfaces within interior buildings, such as garages, pump houses, sheds, and building crawlspaces.

2.0 SAMPLING AND VISUAL ESTIMATION PROCEDURES

The soil sampling and visual estimation of vermiculite procedures for the Troy site have been designed to be conducted simultaneously. The steps that will be completed include establishing sampling zones and sample collection with visual estimation of vermiculite content. To establish the sampling zones the property will be examined and SUAs, CUAs, LUAs, and ISs will be identified. The dimensions of each use area will be measured and the total number of samples will be determined by dividing the total area of the use area by the maximum allowable area listed in Table 1 and rounding up to the nearest integer. The location of each use area and sample location will be plotted on the site sketch. Table 1 lists the maximum size of the sampling area and sample depth for each type of land use area.

TABLE 1
SAMPLING AREA AND DEPTH

Land Use Area	Label	Maximum Area (Square Feet)	Sampling Depth (Inches)
Special Use Area	SUA	1,000	0 – 6
Common Use Areas	CUA	2,500	0 – 3
Limited Use Area	LUA	2,500	0 – 3
Non-Use Area	NUA	Not Sampled	
Interior Surface Zone	IS	1,000	0 – 3

Each soil sample will be a composite of 30 subsamples collected at regular intervals across each exterior or interior use area and each subsample will be inspected for the presence of visible vermiculite (equivalent to a point inspection in the VEVS-SOP). Subsamples will consecutively numbered from 1 to 30 and will be sequential from left to right within each row. The locations and numbering sequence for the subsamples will be recorded on the site sketch.

At each subsample location any cover material including mulch, sod, other vegetation, or debris will be removed. Stainless steel scoops will then be used to collect approximately 80 grams of soil sample from the 0 to 3 inch or 0 to 6 inch soil interval (Table 1) at each subsample location for a total of approximately 2.5 kg of soil. If a small metal shovel is required to assist with sampling to 6 inches, the shovel will be thoroughly cleaned and decontaminated after each sample using procedures outlined below. Each subsample will be examined for the presence of visible vermiculite. The visible presence of vermiculite will be categorized into one of three groups:

- No visible vermiculite

- Low – corresponds to an average of low and moderate levels from the VEVS-SOP
- High – corresponds to an average of high and gross levels from the VEVS-SOP

Subsamples will then be placed into a stainless steel bowl and mixed. After the sample has been homogenized, approximately 2.5 kg of soil will be placed in one re-closable plastic bag and mixed. During sample collection and mixing, the field team will attempt to shield the soil samples from the wind to avoid potentially losing lighter fractions of the soil to the ambient air. At the conclusion of sampling the stainless steel scoop and bowl will be thoroughly cleaned and decontaminated using procedures outlined below.

The initial re-closable plastic bag will be placed inside a second bag as a precaution. A pre-printed sample label will be affixed to the outside of the inner re-closable bag as well as the sample ID number written on the outside of the inner bag. The outer re-closable plastic bag will also be labeled and marked similarly using the pre-printed sample ID numbers. Soil samples will be labeled with a unique sample identification number "TT-XXXXX" where "TT" indicates a "Troy TAPE" sample.

Once all 30 aliquots have been collected, the required field sampling data sheet (FSDS) information will be recorded in the personal digital assistant (PDA). In addition, the global positioning system (GPS) location will be determined for the center of that exterior use area and recorded in the PDA.

The TAPE field team will attempt to restore the land surface to its prior condition after sampling, but Tetra Tech will not be responsible for re-laying sod or replanting. For most sample locations, the small area can be replaced with soil from immediately surrounding the excavation and lightly tamped down. In addition, each TAPE field team will have some commercially-available potting soil or quality topsoil available to repair any small excavations that cannot be easily filled with nearby soil materials. It is not envisioned that sampling will require large-scale disturbance of yards, since the sample size required is small.

4.0 DATA RECORDING

The results from the soil sampling and visual estimation of vermiculite will be recorded electronically in the PDA and locations will be recorded on the site sketch. Information recorded in the PDA for the soil samples will include the physical address, property identification number, owner, land use, date, field logbook number, sampling team, sample identification number, GPS location, matrix, quality control samples, location description, sample time, sample interval, and general comments. For the visual estimation of vermiculite the PDA will be programmed with 30 record boxes (corresponding to each subsample point) with drop-down selections of no visible; low visible; and high visible. As each sample aliquot is collected, the person completing the soil sampling will estimate the visible vermiculite content and relay the information to the team member who will record the data into the PDA. The approximate location of each sample aliquot will also be hand-drawn onto the site sketch. Separate site sketches may be completed for each land use area and attached to the master property site sketch to minimize clutter and increase legibility. The relative location of the sample aliquots will also be correlated with the centrally-recorded GPS location of each soil sample in the Troy database.

5.0 TRAINING

The field team members will be trained on the site specific health and safety plan (HASP) (TAPE Appendix A) and will be responsible for complying with the relevant provisions. Prior to the beginning of the field season all field team members will be trained in all field procedures including inputting data into the PDAs, establishing sampling areas, collecting samples, and completing the visual estimate of vermiculite content. In addition each sampling team will have jars filled with soil containing vermiculite at levels corresponding with low and high vermiculite levels for reference.

The field team leader will rotate among the sampling teams to inspect the sampling and visual estimation of vermiculite procedures. The field team leader will provide direction to the sampling teams to ensure consistency.

6.0 DECONTAMINATION

Stainless steel scoops and bowls will be used for soil and building material sampling; therefore, decontamination of the equipment that is in touch with the soil will be necessary. If a small metal shovel is required to assist with sampling to 6 inches in hard, compacted soils, the shovel will be thoroughly cleaned and decontaminated. Decontamination will occur in the location where the sample was collected and will include spraying the equipment with distilled water followed by drying with paper towels. The water will be allowed to fall on the ground surface within the area just sampled and the paper towels will be placed in a labeled garbage bag.

Visible soil on hands or clothing will be removed by washing with soap and water. Additional personnel decontamination procedures, including requirements for decontamination zones, are described in Section 9.2 of the HASP. PPE will include disposable gloves, disposable protective outerwear, work boots, disposable boot covers, and respirators. The respirators will be cleaned and decontaminated as discussed in the HASP.

This appendix details equipment and supplies identified by Tetra Tech as necessary for the field activities described in this SAP:

Rental

-6 Rental SUVs (Field Vehicles)

Purchased Field Equipment:

-Gilibrator or Buck calibrator (for initial primary standard calibration of rotometers)

-6 Trimble pro-XRS GPS units I think they are model GeoXT ?? at about $5,500 each (includes software)

-6 digital cameras

-7 radios (one for field office, one for field team coordinator, and one for each team) These are just radios; telephones will be purchased under the Office TO)

All office computers were purchased under the office TO

Inspection:

-10 clipboards

-6 x 50-foot tape measures

2 measuring wheels

-Palette knives, etc. (for looking under insulation)

-6 x fiberglass stepladders 6-foot

-1 x 24 foot extension ladder

-Scale bars for photographs

-Field log books

-Graph paper

Sampling:

-¼-inch diameter plastic tubing

-Utility knives

-Ziploc bags (gallon size)

-Wet wipes

-Waterproof permanent markers

-15 x 100 cm^2 templates

-20 x 25-cm rulers

-10 x Trowels

-6 x Sampling spades

-6 x Stainless steel mixing bowls

-Steel sampling spoons

-Sample labels

-Silica sand (asbestos-free) for soil field blanks

-Secure shipment containers

-Bubble wrap for cassette shipment

-Trash bags

-Repair kits (spackling compound, putty knives, caulking)

- Potting soil for lawn repairs

PPE/Safety:

-Respirator for each asbestos inspector (at least 2 brands and 2 sizes)

- FIT Testing week of training; need to bring a Portacount for fit testing (Matt)

-Replacement particulate respirator cartridges - have to be HEPA (Matt)

-Vinyl/nitrile gloves, various sizes

-Disposable Coveralls (Tyvek)

-Work Gloves

-Safety goggles

-Hearing protection devises

-Water bottles/Sports drinks

-Hard hats or bump caps

-6 x first aid kits

-2 x lanyards for fall protection

Decon/Disposal:

-Paper towels

-Bristle brushes

-Water spray bottles

-5-gallon buckets

-Surfactant (Alconox)

-Respirator alcohol wipes

-"Asbestos waste bags" – 7mm thickness (Matt)

-Non-labeled disposal bags

-Polyethylene sheeting 10-mil (for drop cloths)

-Waste storage/HEPA vacuum change area supplies (PVC pipe, 10-mil poly sheeting)

-Duct tape

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-2 laptop computers

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-Spray glue
-6 x HEPA vacuums

Air/Dust Sampling Equipment:
-High-volume air sampling pump (for dust and area sampling)
-Low-volume air sampling pumps (for personal air sampling)
6 x stopwatches
-Microvacuum dust sampling cassettes
-25-mm PCM sampling cassettes
-25-mm TEM sampling cassettes
- Tygon 7 tubing (6.35mm inside diam)
-Sample shipment security seals
-Cassette lot blank samples

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Field Forms (hard copies for backup):
-IFFs
-FSDSs
-Verbal interview forms
-Field audit forms

All was included in Office TO

Other General:

Deleted: **General Office/Sample Storage: (Rent or Purchase)**¶
¶
-Storage shelving Gorilla rack type (2)-Plastic storage boxes (30 to 40)¶
-Desks (3 to 5)¶
-Tables foldable type (6 to 8)¶
-File cabinets metal 4-drawer (3 to 4)¶
-File cabinets metal 2-drawer (2 to 3)¶
-Desk chairs (5 to 7)¶
-Table chairs (20 to 25)

Deleted: ¶

Magnetic signs for vehicles ("Tetra Tech -Troy Property Evaluation Project") (10 to 12)
-T-shirts ("Tetra Tech -Troy Property Evaluation Project") (100 to 150)
-Oxford shirts ("Tetra Tech -Troy Property Evaluation Project") (50 to 80)
-Baseball Hats ("Tetra Tech") (30 to 60)

Date

Name
Mailing Address
City ST Zip

Subject: Troy Asbestos Property Evaluation

Dear :

The Montana Department of Environmental Quality (DEQ), in consultation with the United States Environmental Protection Agency (EPA), and Tetra Tech (an environmental consulting firm retained by DEQ) plan to conduct an Asbestos Property Evaluation for properties in the Troy area this summer. This investigation is a part of the larger asbestos investigation and clean up activities currently occurring in Libby.

Pursuant to Section 104(b) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §9604(b), DEQ requests access to your property located at *********, Troy. Tetra Tech obtained property ownership information from the County Assessor's office. The investigation will include inspection and photodocumentation as needed of all areas (living spaces, walls, basements, attics, etc.) inside buildings on the property and outside of the buildings. DEQ will also collect soil and dust samples from the buildings and around the property. We will be looking for any vermiculite-contaminated insulation and/or soils. The information collected during this investigation will determine the need for any future investigation and cleanup of vermiculite contamination on your individual property.

DEQ would like to conduct these activities in cooperation with you and is providing you a request to obtain access. This is also an opportunity for you to raise any specific questions or concerns. Please feel free to use any of the following resources to obtain additional information or ask any questions you may have.

- DEQ Troy Information Center, 303 N. Third Street, Troy, MT 59935, phone 406-295-9238, or visit the office Monday through Friday from 8:00 a.m. to 5:00 p.m.
- Catherine LeCours, DEQ Project Officer, phone toll free 1-800-246-8198 or e-mail at clecours@mt.gov
- City Hall in Troy, 301 E. Kootenai, or visit the office Monday through Friday from 8:00 a.m. to 5:00 p.m.
- EPA Information Center, 501 Mineral Ave in Libby, Monday through Friday from 8:30 a.m. to 5:00 p.m.
- On the Internet at http://www.epa.gov/region8/superfund/libby.html

Two copies of a "Consent for Entry and Access to Property" form for each property you own are enclosed. Please review, sign one for each property and return it to me in the enclosed envelope no later than April 30, 2007. DEQ will then contact you to schedule the inspection at your convenience.

The Troy Asbestos Property Evaluation is part of the Libby Asbestos Superfund Site process and is being conducted under a cooperative agreement between DEQ and EPA. Please feel free to contact me at the numbers above with any questions or concerns.

Sincerely,

Catherine LeCours
Superfund Project Manager
Remediation Division

Enclosure: Postage paid envelope
Access agreements

Deleted: ***Looks like everything on this form can be populated electronically. I'll have to defer to Ed Madej, Deb Goeldner and Randy Dorian as to what field name in the database goes to each entry on the form. We can also add AD#, BD# or anything else we may use to make the data population and possibly later cross-reference easier. Once Tetra Tech gets local info, we can complete the receipt for the TAPE. ¶***

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Comment [CDL1]: This may become a table with physical addresses or legal descritptions from the Cama? Especially if there are multiple properties under one owner.

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Deleted: phone toll free at 1-888-420-6810, or visit the Center

Montana Department of Environmental Quality
Remediation Division/Federal Superfund Section

DEQ Troy Information Center
303 N. Third St., PO Box 1170
Troy MT 59935
Local in Troy 406.295.9238

1100 North Last Chance Gulch
PO Box 200901
Helena MT 59620-0901
406.841.5040 or 1.800.246.8198

CONSENT FOR ENTRY AND ACCESS TO PROPERTY

Name: ____________________________________

Mail Address: ______________________________ Phone (home): _______________
______________________________ (work): _______________
______________________________ (cell): _______________

Address and/or legal description of property for which consent for entry and access is being granted:

____
____
____

Relationship to property: ___________________
(i.e., owner, owner's representative, tenant, etc.)

I, the undersigned, am the owner, their representative, or otherwise control the real property at the location described above. The State of Montana's Department of Environmental Quality (DEQ) and the United States Environmental Protection Agency (EPA) has requested entry and access to my property pursuant to its response and enforcement responsibilities under the Comprehensive Environmental Response, Compensation and Liability Act as amended (Superfund), 42 U.S.C. 9601 et seq.

I consent to officers, employees, and authorized representatives of the DEQ and EPA, including their authorized contractors, entering and having continued access to my property for the following purposes:

1. Visually inspecting and photographing the property, including the interior and exterior of any home or any other structures on the property;

2. The taking of such soil and/or dust samples as may be determined to be necessary;

3. The taking of actions to mark or temporarily cover exposed vermiculite.

______________________________ ____________
Signature Date

TROY ASBESTOS PROPERTY EVALUATION

Montana Department of Environmental Quality
Remediation Division/Federal Superfund Section

DEQ Troy Information Center
303 N. Third St. PO Box 1170
Troy, MT 59935
Local in Troy 406.295.9238

1100 North Last Chance Gulch
PO Box 200901
Helena MT 59620-0901
406.841.5040 or 1.800.246.8198

Receipt for Samples

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9604(e) authorizes the Montana Department of Environmental Quality (DEQ), its officers, employees and representatives access to inspect and obtain samples from the property identified below. This investigation authority extends to any facility, establishment or other place or property where any hazardous substance, pollutant or contaminant may be or has been generated, stored, treated, placed, disposed of, transported from or has otherwise come to be located or from which there has been or may be a release or threatened release or where entry is needed to determine the need for response, the appropriate response or to effectuate a response.

Property Owner/Operator Information:

Name: ____

Physical Address of property under investigation:____

Mailing Address: ____

Phone (optional):____

The following samples have been collected from this property:

Date	Media	Sample ID Number	Analysis to be performed

The above referenced samples have been collected in accordance with a sampling and analysis plan:
- ❑ Without variation; or
- ❑ With variation(s) from the plan as detailed in the Request for Modification form.

The property owner/operator was offered a portion of the samples taken (split samples) at the person's cost. The property owner/operator elected to:
- ❑ Accept a split sample; or
- ❑ Decline a split sample.

DEQ will mail the sampling results to the person identified above when they become available.
Copy of this receipt provided to property owner/operator, per request on electronically insert date printed .

DEQ representative:

_________________________________ CATHERINE LeCOURS
Signature Printed Name

APPENDIX F

SOIL PREPARATION WORK PLAN
Revision B

LIBBY ASBESTOS SITE – OPERABLE UNIT 7
TROY, MONTANA

Prepared By:

United Stated Environmental Protection Agency, Region 8
Ecosystem Protection and Remediation – Program Support

And:

Techlaw, Inc.
EPA Region 8's ESAT Contractor
16194 West 45th Drive
Golden, Colorado 80403
(303) 312-7726

March 2007

Distribution List
Work Plan – Libby Asbestos Site – Operable Unit 7

The following is a list of personnel who will receive a copy of this Work Plan. Agency and/or contractor roles on this project are also listed for each individual.

Name	Organization	Role
Paul Peronard	Environmental Protection Agency	Libby Team Leader
Catherine Lecours	Montana DEQ	Troy Project Manager
Roger Hoogerheide	Environmental Protection Agency	Troy Project Manager
Mary Goldade	Environmental Protection Agency	Chemist
Greg Saunders	Environmental Protection Agency	EPA Health and Safety Officer
Donald Goodrich	Techlaw, Inc.	ESAT Team Leader
John Calanni	Techlaw, Inc.	ESAT Group Leader ESAT Health and Safety Officer
Doug Kent	Techlaw, Inc.	ESAT Microscopist
Steven Auer	Techlaw, Inc.	ESAT Field Crew
Mike Brewer	Techlaw, Inc.	ESAT Field Crew
Deborah Goeldner	Techlaw, Inc.	ESAT Field Crew
Francisco Lapostol	Techlaw, Inc.	ESAT Field Crew
John Weiber	Techlaw, Inc.	ESAT Field Crew
Martin McComb	Environmental Protection Agency	EPA Project Officer
Jennifer Slavick	Environmental Protection Agency	EPA Field Crew
Tont Selle	Environmental Protection Agency	EPA Field Crew

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Acronym List

CRZ	Contamination Reduction Zone
EPA	Environmental Protection Agency
HEPA	High Efficiency Particulate Air
IDW	Investigation-derived Wastes
MT-DEQ	Montana Department of Environmental Quality
PPE	Personal Protective Equipment
QA	Quality Assurance
QC	Quality Control
SAP	Sampling and Analysis Plan
SOP	Standard Operating Procedure
SPF	Sample Preparation Facility
SZ	Support Zone
TAPE	Troy Asbestos Property Evaluation
WZ	Work Zone

1.0 INTRODUCTION

This document serves as the soil preparation work plan for Operable Unit 7 of the Libby Asbestos Site, located in Troy, Montana. This work plan details requirements and procedures specific to the soil preparation activities that will occur at the Sample Preparation Facility (SPF) located in Troy. The purpose of this work plan is two fold. First, it is to provide guidance to ensure that all preparation procedures and measurements are scientifically sound and of known, acceptable, and documented quality. Second, this work plan outlines a laboratory monitoring program consisting of ambient air samples, personal air samples, and dust samples that will be implemented to determine potential exposure and cross-contamination. All requirements and activities described in the Troy Asbestos Property Evaluation (TAPE) Sampling and Analysis Plan (SAP) still apply.

The following sections and appendices are included in this work plan:

Section 1 - Introduction
Section 2 - Methods and Procedures
Section 3 - Quality Assurance/Quality Control

Appendix A	-	Quality Assurance Manager Checklist
Appendix B	-	Soil Sample Preparation Method
Appendix C	-	Packaging and Shipping of Environmental Samples
Appendix D	-	Sample Custody
Appendix E	-	Field Sample Data Sheet
Appendix F	-	Chain-of-Custody Form
Appendix G	-	Record of Deviation/Request for Modification Form
Appendix H	-	Health and Safety Plan

1.1 Objective

Following are the objectives of this work plan:

- *Prepare soil samples collected from locations within Operable Unit 7 for analysis.*

  Sample preparation procedures will include drying, sieving, splitting, and grinding. These procedures are designed to produce a sample with well-homogenized material of a relatively standard particle size for asbestos analysis.

- *Ship prepared samples to appropriate analytical laboratories.*

  Sample shipping activities will include generating Chain of Custody (COC) documentation, labeling, packaging, and physically shipping samples to the appropriate analytical laboratory.

1.2 Project Overview, Schedule and Deliverables

Mobilization, set-up of the SPF, and training for Crew Leaders (???, Calanni, McComb and Selle) will take place in Troy April 17 – 24, 2007.

Actual sample processing in the SPF will be performed by crews of 3. These crews will be staffed by employees of the Environmental Protection Agency (EPA) and members of the EPA Region 8 Environmental Services Assistance Team (ESAT). Field crews will be deployed during the following periods of the 2007 field season:

- April 30 – May 11 (Crew Leader: Calanni)
- June 4 – June 15 (Crew Leader: McComb)
- July 9 – July 20 (Crew Leader: Selle)
- August 20 – August 30 (Crew Leader: ???)
- September 24 – October 5 (Crew Leader: McComb)

During each deployment, a daily Quality Assurance (QA) checklist as provided in Appendix A will be completed. If any deficiencies are noted in a daily QA checklist, the EPA Region 8 ESAT Project Officer and MT-DEQ Project Manager will be notified and corrective action will then be determined by all parties. If the possible, the corrective action will be immediately implemented. If the corrective action cannot or is not immediately implemented, then an improvement plan will be issued. If the actions included in the improvement plan are not completed by the due date on the plan, the EPA Region 8 ESAT Project Officer and MT-DEQ Project Manager will try to resolve the issue. If the deficiency cannot be resolved within a week after the improvement plan due date, a corrective action will be taken.

In addition to the daily QA checklists, EPA/ESAT will deliver a Progress and Quality Assurance Report to the Montana Department of Environmental Quality (MT-DEQ) at the end of each deployment. These reports will include: 1) the number of samples that have been checked-in, prepared for analysis, and shipped to appropriate laboratories and 2) copies of all daily QA checklists generated during that deployment.

1.3 Sample Preparation Facility Location and Description

The Sample Preparation Facility (SPF) will be located in Troy, MT and will be housed in a former ambulance barn that is currently vacant. The SPF will consist of a Support Zone (SZ), Contamination Reduction Zone (CRZ), Work Zone (WZ), and Archival Zone (AZ). The Support Zone (SZ) will be accessible to individuals without personal protective equipment (PPE) and will include a designated sample storage area and a sample check-in / shipping counter. Adjacent to the SZ will be the Contamination Reduction Zone (CRZ). Donning and doffing of PPE will be performed in the CRZ as discussed in the health and safety plan (Appendix H). Adjacent to the CRZ is the Work Zone (WZ). No personnel will be admitted into the WZ without the appropriate PPE. The WZ will include a drying area (consisting of three ovens within a containment chamber) and a sample preparation area (consisting of two fume hoods with sample grinders and other equipment). The containment chamber and fume hoods will be under negative pressure and vented through high efficiency particulate air (HEPA) filter units designed to remove particles less than .3 microns in diameter. Adjacent to the CRZ will be the Archival Zone (AZ). The AZ will be a secure location designed for post-preparation sample archival. A schematic of the SPF is included in Figure 1.3-1.

2.0 METHODS AND PROCEDURES

The following is a list of activities that will be performed by EPA/ESAT personnel at the SPF:

- Sample receipt and check-in
- Sample archival
- Sample drying
- Sample splitting
- Sample sieving
- Fine sample grinding
- Sample packaging and shipping
- Preparation measurements
- Documentation
- Equipment decontamination

All sample preparation procedures will follow the Technical Standard Operating Procedure (SOP), Soil Sample Preparation, provided in Appendix B. The following subsections may also reference other EPA and/or ESAT SOPs. The procedures followed at the soil preparation facility are shown in Figure 2.0-1.

2.1 Sample Receipt and Check-in

MT-DEQ/TetraTech Field Personnel will store samples that are collected in the sample storage area located in the SPF's Support Zone (Figure 1.3-1). At the beginning of each sample preparation period, stored samples will be checked in to verify the sample identification labels match the data that was collected and uploaded to Scribe. If there are any discrepancies between the two, the EPA Region 8 ESAT Project Officer and MT-DEQ Project Manager will be notified, and the discrepancy will be corrected. The sample identification numbers of all of the samples (parent and quality control [QC]) will be entered into an electronic soil preparation tracking form and uploaded to the Scribe Sampling Project.

2.2 Sample Storage

All samples will be contained as directed in the Soil Sample Preparation SOP (Appendix B). Whenever the samples are not being processed, they will be stored in the plastic totes used by the Field Teams, the coolers used for sample shipping, or the plastic totes used for archival. All totes and coolers will be labeled with either an inventory batch number or other identifier that represents the samples contained within. The archive containers will be arranged in numerical order by inventory batch number for easy retrieval. Archive containers will be stored in a secure Archival Zone in the SPF (Figure 1.3-1). The samples do not require refrigeration but must be kept in an orderly, clean fashion.

2.3 Sample Drying, Splitting, Sieving, and Grinding

All samples will be dried, split, sieved, and ground in accordance with the Soil Sample Preparation SOP (Appendix B). The following is a chronological summary of the general protocol for these activities. First, the sample will be dried in an oven, then the sample will be split and approximately half will be archived. The sub-sample NOT archived will again be split in half if a duplicate is required, and the duplicate aliquot will follow the same procedures as the original portion. If no duplicate is required, the total sample will be sieved, and the coarse fraction will be contained for analysis (with a suffix label of labeled "C" for coarse). The finer fraction will then be ground and split into four sub-samples (with a suffix of either labeled "FG1," "FG2," "FG3,", and "FG4""). Three of the subsamples will be archived and the subsample labeled "FG1" will be sent for analysis. If further analyses are required for the fine ground portion, the subsequent aliquot will be sent (i.e., FG2, then FG3, etc.).

2.4 Sample Packaging and Shipping

All samples will be packaged and shipped in accordance with the Packaging and Shipping of Environmental Samples SOP (Appendix C). Custody will also be tracked by following the Sample Custody SOP (Appendix D) with COC forms being created in Scribe.

2.5 Soil Preparation Measurements

The only measurement data collected by EPA/ESAT personnel related to soil samples are oven temperatures and samples masses. The oven temperatures and the sample masses will be collected and recorded on the sample preparation form as indicated in the Soil Preparation SOP (Appendix B). Measurement data requirements related to for laboratory environmental and health and safety exposure monitoring are included in the Health and Safety Plan for this project (Appendix H).

2.6 Documentation

All activities will be documented as required in the Sample Preparation SOP (Appendix B). Additional required QA/QC documentation is described in Section 3.0.

2.7 Equipment Decontamination

All equipment will be decontaminated prior to use in accordance with the Sample Preparation SOP (Appendix B). This decontamination will be conducted after and/or before each sample is in direct contact with any piece of equipment.

2.8 Investigation-Derived Waste Containment

Investigation-derived waste (IDW) consists of PPE, (i.e., tyvek and respirator filters), HEPA filters (i.e., hood and vacuum), and decontamination waste (i.e., excess sample and silica sand vacuumed from the hood and around the SPF during decontamination). The PPE and filters will be collected after each use and stored in plastic bags (e.g., trash bags) until disposal. The decontamination waste will be stored in lidded buckets until disposal. All IDW will be double-contained and disposed of as municipal waste.

3.0 QUALITY ASSURANCE/QUALITY CONTROL

This section details the internal QA/QC samples, equipment calibration, QA/QC checks, audits/corrective actions, and training requirements.

3.1 Quality Assurance/Quality Control Samples

Two types of QA/QC samples will be collected during the preparation process: preparation duplicates and preparation blank samples, each of which will be discussed below.

3.1.1 Preparation Duplicate Samples

Preparation duplicate samples are splits of samples submitted for sample preparation after drying but prior to sieving. These samples serve to evaluate the precision of both the sample preparation process and the laboratory analysis. One preparation duplicate sample will be processed for every 20 field samples prepared. The preparation duplicate samples are given sample identification numbers provided by sample coordination personnel. For each preparation duplicate prepared, a field sample data sheet (FSDS) (Appendix E) is completed as detailed in the TAPE SAP.

3.1.2 Preparation Blank Samples

Preparation blank samples are prepared to determine if decontamination procedures of laboratory equipment used to prepare asbestos samples are adequate to prevent cross-contamination of samples during sample preparation. The preparation blank consists of clean quartz sand. At least one preparation blank will be processed with each batch of field samples. A batch of samples is a group of samples that have been prepared together for analysis at the same time (approximately 120). The preparation blank samples are given sample identification numbers provided by sample coordination personnel. For each preparation blank prepared, an FSDS (Appendix E) is completed as detailed in the TAPE SAP.

3.2 Equipment Calibration

Instrumentation requiring calibration or routine function checks include sample grinders, drying ovens, ventilation hood (HEPA filter and velocity), HEPA vacuum, and the analytical balance. Table 3.2-1 summarizes the calibration procedures, frequency, and location of documentation for each piece of equipment. The following sections include a detailed description of each of the calibration procedures.

3.2.1 Grinder Calibration

The vertical plate grinder will be calibrated every day it is used and every time the disk depth is adjusted to verify target particle size. Approximately 50 to 100 grams (g) of clean quartz sand are processed through the grinder. The ground sand is then passed through a 60-mesh and a 200-mesh sieve. Calibration is successful when all of the ground sand passes through the 60-mesh sieve and some portion of the ground sand is retained on the 200-mesh sieve. Grinder calibration is documented in the SPF logbook and on the grinder calibration and maintenance log (Soil Preparation SOP, Appendix B).

3.2.2 Drying Oven Calibration/Check

The drying oven calibration is checked once per week by setting the temperature control to 90^0C and letting the oven come up to the set temperature. A thermometer is placed in the oven and the temperature is recorded. The acceptable criteria is +/- 1^0C. If the calibration fails, repairs are made to the oven until recalibration of the oven is in agreement with acceptable criteria. All oven calibration will be documented in the SPF logbook and on the oven temperature calibration and maintenance log (Soil Preparation SOP, Appendix B).

3.2.3 Ventilation Hood Operating Condition Verification

Two calibration checks will be conducted on the ventilation hood. One will be a check of the hood's HEPA filter, and the second will be a check of the negative flow velocity.

The ventilation hood HEPA filter has an indicator light located on the front panel that identifies whether the filter needs to be changed. This panel will be checked daily to ensure that the HEPA filter is operating correctly. If the filter change light is on, the filter will be changed before any operations proceed in the hood. All ventilation hood operating condition verification checks and maintenance will be documented in the SPF logbook and the ventilation hood operating condition verification and maintenance log (Soil Preparation SOP, Appendix B).

The velocity of the negative flow HEPA hood will be checked with a flow meter/anemometer daily. The minimum allowable velocity in the negative flow HEPA hood will be 100 feet per minute. A line will be drawn on the hood sash frame indicating the sash location where the minimum velocity is observed. The sash will not be opened further than this point, and during grinding operations, the sash will be lowered to increase the flow velocity.

3.2.4 HEPA Vacuum Filter Check

The HEPA vacuum used to decontaminate the grinder, splitter, sieves, pans, and other decontamination areas will be checked daily for correct operations. Replacement of either the bag or filter will be performed in the hood. All vacuum checks and maintenance will be documented in the SPF logbook and the vacuum maintenance log (Soil Preparation SOP, Appendix B).

3.2.5 Analytical Balance Calibration Check

The calibration of the balance used to weigh samples will be checked daily. Class-S weights will be used to verify the internal calibration at 0.1g, 1g, 10g, and 100g. Tolerance limits for the calibration check are +/- 0.1 g. If the balance fails the calibration check, the balance will be re-calibrated. All analytical balance calibration checks and maintenance will be documented in the SPF logbook and the analytical balance calibration and maintenance log (Soil Preparation SOP, Appendix B).

3.3 Laboratory Housekeeping

The following housekeeping measures will be put in place to help ensure a safe and clean working environment. These measures are discussed further within Attachment 1 of the SPF HASP (Appendix H).

- The walls and counter top of the negative flow HEPA hood will be wet wiped and HEPA vacuumed after the completion of each day.

- Sticky mats will be placed in the doorways of the Work Zone, Contamination Reduction Zone, Support Zone and the Archival Zone to reduce the volume of material brought into the laboratory from the outside. Additionally, sticky mats will reduce the potential to track materials throughout the laboratory.

- Areas of sample handling and preparation, including floors, will be HEPA vacuumed and wet wiped at the end of each day.

- The sample drying ovens will be HEPA vacuumed and wet wiped after each batch of samples.

3.4 Quality Assurance/Quality Control Checks

A series of QA/QC checks will be used to ensure data are accurate and recorded according to the procedures of this Work Plan, the Soil Sample Preparation SOP, and eLASTIC SOP.

3.4.1 Sample Receipt and Check-In

At the beginning of each sample preparation period, stored samples will be checked in by two different people to verify the sample identification labels match the data that was collected and uploaded to Scribe. If there are any discrepancies, the EPA Region 8 ESAT Project Officer and MT-DEQ Project Manager will be notified, and the discrepancy will be corrected.

3.4.2 Sample Drying and Sieving

Once each day an EPA/ESAT member other than the sample preparer must check the sample preparation form to ensure all entries are complete and correct. The reviewer will initial and date the sample preparation forms after review. If any entries are not complete or correct, the person originally filling out the form will correct the form and then be retrained so that future mistakes are not made.

3.4.3 Sample Packaging and Shipping

For every sample shipment from the SPF, a second person will check the prepared COC form against the shipment contents to ensure all samples in the shipment appear on the COC form (and vise versa), all sample labels (both inside and outside bags) are correct, and there are no duplicate or missing labels. The reviewer will initial and date the COC forms after review. If there are any discrepancies, the person who originally packaged the cooler for shipment will be retrained so as to reduce the potential for future mistakes.

3.4.4 Sample Preparation Facility Calibration and Maintenance

A second person, other than the person that performed the equipment calibration and/or maintenance, must check the calibration and/or maintenance log sheets at some point during the daily operations to ensure the logs and calibration procedures were completed. The reviewer will initial and date the log sheets after review. If it is noted that the logsheets or calibration procedures have not been completed, the person who originally conducted the calibration will be retrained so that the logbooks and calibration procedures will be completed and correct in the future.

3.4.5 Documentation

This section describes the QA/QC of SPF documentation and procedures for making corrections to the SPF documentation.

Logbooks

Details regarding each sample preparation step will be recorded in the laboratory logbook in accordance with the Sample Preparation SOP (Appendix B). The log is an accounting of activities and will duly note problems or deviations from the governing plans and observations relating to the soil preparation activities. Information that is already recorded in log sheets (i.e., grinder calibration log, ventilation hood log, etc.) does not need to be duplicated in the log book, however daily activities performed should be included. Upon issuance of a logbook, the logbook will be given a document control number. Logbook pages will be copied at the end of each sample preparation period and turned over to the EPA. Upon completion of the logbook, it will be relinquished to the EPA. Details about what information should be recorded in the logbook are included in the above SOP. A person other than the one who completed the entries will check logbook entries at the end of each day. The logbook checks will ensure all relevant information has been recorded. If any logbook entries are incorrect or incomplete, the person originally entering the information into the logbook will be retrained so that future logbook entries are complete and correct.

Chain of Custody Requirements

COC procedures will follow the requirements stated in the Sample Custody SOP (Appendix D). The COC record is used as physical evidence of sample custody and control. This record system provides the means to identify, track, and monitor each individual sample from the point of collection through final data reporting. A complete COC record is required to accompany each shipment of samples. Upon receipt and prior to the shipment of samples, the COC should be checked against the contents of the cooler as detailed above. An example of the COC used at the SPF is provided in Appendix F.

Electronic Troy Asbestos Sample Tracking Information Center

The Scribe database will be used to track various pieces of information during the sample preparation process. EPA/ESAT personnel other than the person who completed the data entry will check 100% percent of the data entered into Scribe on a weekly basis.

Forms

FSDS, preparation log sheets, and calibration and maintenance logs must be completed in accordance with the Soil Sample Preparation SOP (Appendix B). When these sheets have been completed, ESAT personnel, other than the person who completed the sheet, will check to ensure the data are accurate and complete as detailed above.

Sample Labeling

As described in the Soil Sample Preparation SOP (Appendix B), suffixes are added to sample identification numbers to indicate bulk fraction, coarse fraction, fine fraction, fine, ground fraction, and the archived portion of each of these fractions. Table 3.4-1 presents the suffix identification codes and descriptions.

In addition to labeling individual samples, storage boxes are also labeled as described in the Sample Preparation SOP (Appendix B). Prior to shipment, if a sample is shipped immediately after preparation, or prior to storage of a sample, EPA/ESAT personnel will check each sample aliquot to determine if the suffix of the sample identification number corresponds to the sample appearance. The reviewer will initial and date the label after review. If it has been identified that a portion of the sample does not correlate with the aliquot associated with the label, the label will be corrected. It will also be determined why this discrepancy occurred and actions will be taken so that it will not happen in the future.

Correction to and Deviations from Documentation

For the logbook modifications, a single strikeout initial and date is required for documentation changes. The correct information should be entered in close proximity to the erroneous entry. These procedures will also be followed for corrections to any form (FSDS, log sheets, and COCs). All deviations from the guidance documents will be recorded in the logbooks and the Libby Asbestos Project Record of Deviation/Request for Modification Form (MOD) (Appendix G). All MOD forms are to be completed, approved and recorded following the Approval of the MT-DEQ Project Manager and the EPA ESAT Project Officer.

3.4.6 Quality Assurance/Quality Control Check Corrective Actions

Immediate actions will be taken to correct any findings during the daily QA/QC checks, if applicable. If immediate action is not applicable, an implementation plan must be completed and approved by the ESAT Project Officer, EPA, and MT-DEQ. If corrective action is immediate, the action will be documented in the SPF logbook, and the ESAT Project Officer, EPA, and MT-DEQ will be notified of the corrective action within 3 days.

3.5 Audits and Corrective Actions

An internal audit will be performed during the initial implementation of this Work Plan. If findings of this audit show the procedures of this Work Plan are not being implemented (i.e., many deficiencies are identified), an additional audit may be conducted within one week of the initial audit. An additional audit will be performed when samples are being prepared on a large scale (i.e., during full-time operation of the SPF for preparation and full-time analysis). If significant procedural changes occur during the study, additional field audits may be conducted to ensure the new methods are implemented and followed appropriately. Audit reports will be completed following each audit and will be provided to EPA, upon request. Response actions may be implemented to correct quality problems as detailed above. All corrective actions will be documented in accordance with this Work Plan.

3.6 Training Requirements

Personnel performing sample preparation activities must have read and understood this Work Plan, the SPF health and safety plan, and all associated SOPs. In addition, personnel must have completed 40-hour Occupational Safety and Health Administration (OSHA) hazardous waste operations training and annual updates, as required. Additional training may be identified prior to project implementation and will be administered prior to any individual beginning work at the SPF.

Tables

Table 3.2-1 Calibration Summary Table

Instrument	Frequency	Where Documented
Grinder	Daily or every time plate depth is adjusted	Grinder calibration and maintenance log
Drying Oven	Weekly	Oven temperature calibration and maintenance log
Ventilation Hood	Daily	Ventilation hood log
HEPA Vacuum	As needed	Vacuum maintenance log
Analytical Balance	Daily	Balance maintenance log

Table 3.4-1 Suffix Identification Codes and Description

Code	Description
C	Coarse - sample fraction that does not pass through a 1/4 -inch sieve
B	Bulk - sample fraction that passes through a 3/8-inch sieve, but is not ground
F	Fine - sample fraction that passes through a 1/4 -inch sieve
FG	Fine Ground - sample fraction that passes through a 1/4 -inch sieve and is ground to approximateley 250 um
FGS	Fine Ground Sieve- sample fraction that passes through a 3/8 -inch sieve and is ground to approximately 250 um
ACA	Archive Coarse - the archived portion of the coarse fraction
ABA	Archive Bulk - the archived portion of the bulk fraction
AFA	Archive Fine - the archived portion of the fine fraction
AFGA	Archive Fine Ground - the archived portion of the fine ground fraction
AFGS	Archive Fine Ground Sample - the archived portion of the fine ground sample fraction

Figures

Figure 1.3-1 Sample Preparation Facility Layout

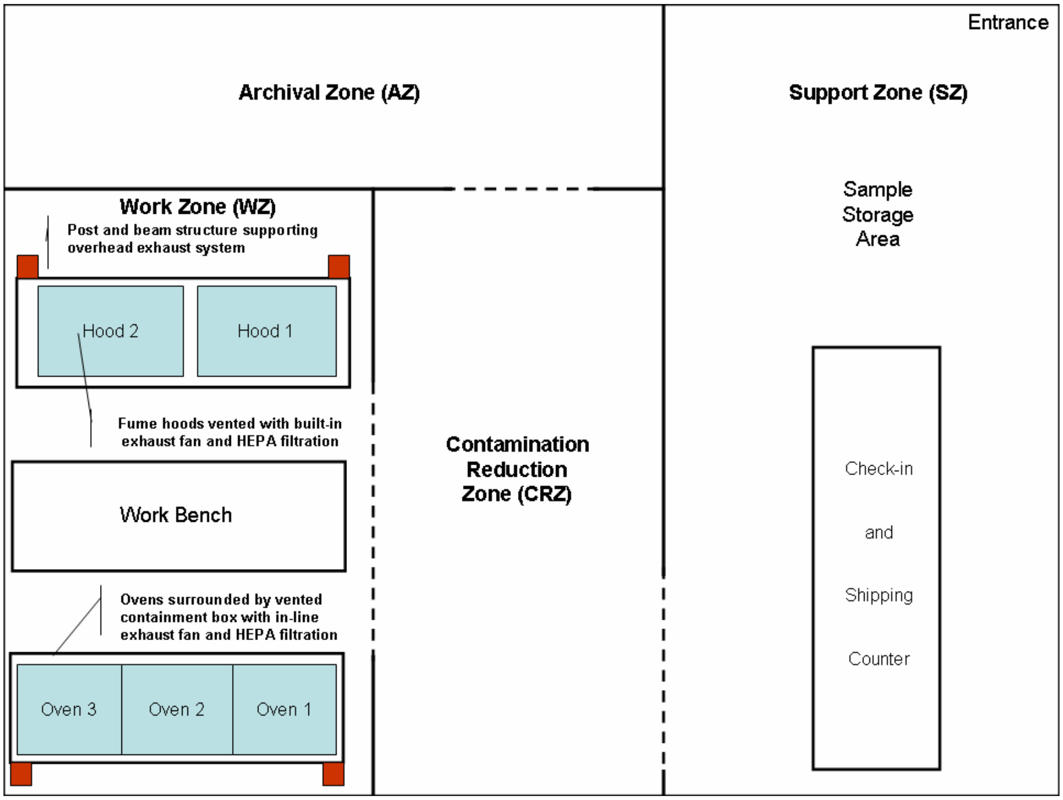
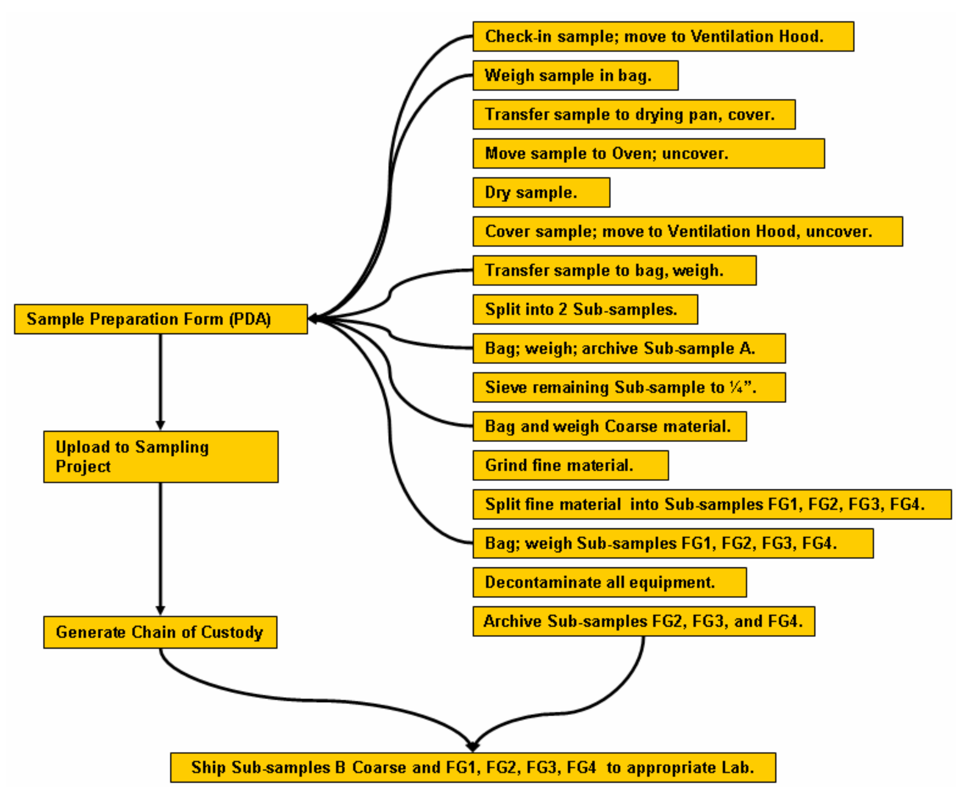


Figure 2.0-1 Soil Sample Preparation Work Flow



Stainless steel scoops and bowls will be used for soil and building material sampling; therefore, decontamination of the equipment that is in touch with the soil will be necessary. If a small metal shovel is required to assist with sampling to 6 inches in hard, compacted soils, the shovel will be thoroughly cleaned and decontaminated. Decontamination will occur in the location where the sample was collected. and will include spraying the equipment with distilled water followed by drying with paper towels. The water will be allowed to fall on the ground surface within the area just sampled and the paper towels will be placed in a labeled garbage bag.

Visible soil on hands or clothing will be removed by washing with soap and water. Additional personnel decontamination procedures, including requirements for decontamination zones, are described in Section 9.2 of the HASP (Appendix A). PPE will include disposable gloves, disposable protective outerwear, work boots, disposable boot covers, and respirators. The respirators will be cleaned and decontaminated as discussed in the HASP (Appendix A).

ASBESTOS SAMPLING

SOP#: 2015
DATE: 11/17/94
REV. #: 0.0

1.0 SCOPE AND APPLICATION

Asbestos has been used in many commercial products including building materials such as flooring tiles and sheet goods, paints and coatings, insulation, and roofing asphalts. These products and others may be found at hazardous waste sites hanging on overhead pipes, contained in drums, abandoned in piles, or as part of a structure. Asbestos tailing piles from mining operations can also be a source of ambient asbestos fibers. Asbestos is a known carcinogen and requires air sampling to assess airborne exposure to human health. This Standard Operating Procedure (SOP) provides procedures for asbestos air sampling by drawing a known volume of air through a mixed cellulose ester (MCE) filter. The filter is then sent to a laboratory for analysis. The U.S. Environmental Protection Agency/Environmental Response Team (U.S. EPA/ERT) uses one of four analytical methods for determining asbestos in air. These include: U.S. EPA's Environmental Asbestos Assessment Manual, Superfund Method for the Determination of Asbestos in Ambient Air for Transmission Electron Microscopy (TEM)(1); U.S. EPA's Modified Yamate Method for TEM(2); National Institute for Occupational Safety and Health (NIOSH) Method 7402 (direct method only) for TEM; and NIOSH Method 7400 for Phase Contrast Microscopy (PCM)(3). Each method has specific sampling and analytical requirements (i.e., sample volume and flow rate) for determining asbestos in air.

The U.S. EPA/ERT typically follows procedures outlined in the TEM methods for determining mineralogical types of asbestos in air and for distinguishing asbestos from non-asbestos minerals. The Phase Contrast Microscopy (PCM) method is used by U.S. EPA/ERT as a screening tool since it is less costly than TEM. PCM cannot distinguish asbestos from non-asbestos fibers, therefore the TEM method may be necessary to confirm analytical results. For example, if an action level for the presence of fibers has been set and PCM analysis indicates that the action level has been exceeded, then TEM analysis can be used to quantify and identify asbestos structures through examination of their morphology crystal structures (through electron diffraction), and elemental composition (through energy dispersive X-ray analysis). In this instance samples should be collected for both analyses in side by side sampling trains (some laboratories are able to perform PCM and TEM analysis from the same filter). The Superfund method is designed specifically to provide results suitable for supporting risk assessments at Superfund sites, it is applicable to a wide range of ambient air situations at hazardous waste sites. U.S. EPA's Modified Yamate Method for TEM is also used for ambient air sampling due to high volume requirements. The PCM and TEM NIOSH analytical methods require lower sample volumes and are typically used indoors; however, ERT will increase the volume requirement for outdoor application.

Other Regulations pertaining to asbestos have been promulgated by U.S. EPA and OSHA. U.S. EPA's National Emission Standards for Hazardous Air Pollutants (NESHAP) regulates asbestos-containing waste materials. NESHAP establishes management practices and standards for the handling of asbestos and emissions from waste disposal operations (40 CFR Part 61, Subparts A and M). U.S. EPA's 40 CFR 763 (July 1, 1987)(4) and its addendum 40 CFR 763 (October 30, 1987)(4) provide comprehensive rules for the asbestos abatement industry. State and local regulations on these issues vary and may be more stringent than federal requirements. The OSHA regulations in 29 CFR 1910.1001 and 29 CFR 1926.58 specify work practices and safety equipment such as respiratory protection and protective clothing when handling asbestos. The OSHA standard for an 8-hour, time-weighted average (TWA) is 0.2 fibers/cubic centimeters of air. This standard pertains to fibers with a length-to-width ratio of 3 to 1 with a fiber length >5 µm(5,6). An action level of 0.1 fiber/cc (one-half the OSHA standard) is the level U.S. EPA has established in which employers must initiate such activities as air monitoring, employee training, and medical surveillance[5,6].

These are standard (i.e., typically applicable) operating procedures which may be varied or changed as required, dependent upon site conditions, equipment limitations or limitations imposed by the procedure. In all instances, the ultimate procedures employed should be documented and associated with the final report.

Mention of trade names or commercial products does not constitute U.S. EPA endorsement or recommendation for use.

2.0 METHOD SUMMARY

Prior to sampling, the site should be characterized by identifying on-site as well as off-site sources of airborne asbestos. The array of sampling locations and the schedule for sample collection, is critical to the success of an investigation. Generally, sampling strategies to characterize a single point source are fairly straightforward, while multiple point sources and area sources increase the complexity of the sampling strategy. It is not within the scope of this SOP to provide a generic asbestos air sampling plan. Experience, objectives, and site characteristics will dictate the sampling strategy.

During a site investigation, sampling stations should be arranged to distinguish spatial trends in airborne asbestos concentrations. Sampling schedules should be fashioned to establish temporal trends. The sampling strategy typically requires that the concentration of asbestos at the source (worst case) or area of concern (downwind), crosswind, as well as background (upwind) contributions be quantified. See Table 1 (Appendix A) for U.S. EPA/ERT recommended sampling set up for ambient air. Indoor asbestos sampling requires a different type of strategy which is identified in Table 2 (Appendix A). It is important to establish background levels of contaminants in order to develop a reference point from which to evaluate the source data. Field blanks and lot blanks can be utilized to determine other sources.

Much information can be derived from each analytical method previously mentioned. Each analytical method has specific sampling requirements and produce results which may or may not be applicable to a specific sampling effort. The site sampling objectives should be carefully identified so as to select the most appropriate analytical method. Additionally, some preparation (i.e., lot blanks results) prior to site sampling may be required, these requirements are specified in the analytical methods.

3.0 SAMPLE PRESERVATION, CONTAINERS, HANDLING, AND STORAGE

3.1 Sample Preservation

No preservation is required for asbestos samples.

3.2 Sample Handling, Container and Storage Procedures

1. Place a sample label on the cassette indicating a unique sampling number. Do not put sampling cassettes in shirt or coat pockets as the filter can pick up fibers. The original cassette box is used to hold the samples.

2. Wrap the cassette individually in a plastic sample bag. Each bag should be marked indicating sample identification number, total volume, and date.

3. The wrapped sampling cassettes should be placed upright in a rigid container so that the cassette cap is on top and cassette base is on bottom. Use enough packing material to prevent jostling or damage. Do not use vermiculite as packing material for samples. If possible, hand carry to lab.

4. Provide appropriate documentation with samples (i.e., chain of custody and requested analytical methodology).

4.0 INTERFERENCES AND POTENTIAL PROBLEMS

Flow rates exceeding 16 liters/minute (L/min) which could result in filter destruction due to (a) failure of its physical support under force from the increased pressure drop; (b) leakage of air around the filter mount so that the filter is bypassed, or (c) damage to the asbestos structures due to increased impact velocities.

4.1 U.S. EPA's Superfund Method

4.1.1 Direct-transfer TEM Specimen Preparation Methods

Direct-Transfer TEM specimen preparation methods have the following significant interferences:

- C The achievable detection limit is restricted by the particulate density on the filter, which in turn is controlled by the sampled air volume and the total suspended particulate concentration in the atmosphere being sampled.

- C The precision of the result is dependent on the uniformity of the deposit of asbestos structures on the sample collection filter.

- C Air samples must be collected so that they have particulate and fiber loadings within narrow ranges. If too high a particulate loading occurs on the filter, it is not possible to prepare satisfactory TEM specimens by a direct-transfer method. If too high a fiber loading occurs on the filter, even if satisfactory TEM specimens can be prepared, accurate fiber counting will not be possible.

4.1.2 Indirect TEM Specimen Preparation Methods

Indirect TEM specimen preparation methods have the following interferences:

- C The size distribution of asbestos structures is modified.

- C There is increased opportunity for fiber loss or introduction of extraneous contamination.

- C When sample collection filters are ashed, any fiber contamination in the filter medium is concentrated on the TEM specimen grid.

It can be argued that direct methods yield an under-estimate of the asbestos structure concentration because many of the asbestos fibers present are concealed by other particulate material with which they are associated. Conversely, indirect methods can be considered to yield an over-estimate because some types of complex asbestos structures disintegrate during the preparation, resulting in an increase in the numbers of structures counted.

4.2 U.S. EPA's Modified Yamate Method for TEM

High concentrations of background dust interfere with fiber identification.

4.3 NIOSH Method for TEM

Other amphibole particles that have aspect ratios greater than 3:1 and elemental compositions similar to the asbestos minerals may interfere in the TEM analysis. Some non-amphibole minerals may give electron diffraction patterns similar to amphiboles. High concentrations of background dust interfere with fiber identification.

4.4 NIOSH Method for PCM

PCM cannot distinguish asbestos from non-asbestos fibers; therefore, all particles meeting the counting criteria are counted as total asbestos fibers. Fiber less than 0.25 um in length will not be detected by this method. High levels of non-fibrous dust particles may obscure fibers in the field of view and increase the detection limit.

5.0 EQUIPMENT/MATERIALS

5.1 Sampling Pump

The constant flow or critical orifice controlled sampling pump should be capable of a flow-rate and pumping time sufficient to achieve the desired volume of air sampled.

The lower flow personal sampling pumps generally provide a flow rate of 20 cubic centimeters/minute (cc/min) to 4 L/min. These pumps are usually battery powered. High flow pumps are utilized when flow rates between 2 L/min to 20 L/min are required. High flow pumps are used for short sampling periods so as to obtain the desired sample volume. High flow pumps usually run on AC power and can be plugged into a nearby outlet. If an outlet is not available then a generator should be obtained. The generator should be positioned downwind from the sampling pump. Additional voltage may be required if more than one pump is plugged into the same generator. Several electrical extension cords may be required if sampling locations are remote.

The recommended volume for the Superfund method (Phase I) requires approximately 20 hours to collect. Such pumps typically draw 6 amps at full power so that 2 lead/acid batteries should provide sufficient power to collect a full sample. The use of line voltage, where available, eliminates the difficulties associated with transporting stored electrical energy.

A stand should be used to hold the filter cassette at the desired height for sampling and the filter cassette shall be isolated from the vibrations of the pump.

5.2 Filter Cassette

The cassettes are purchased with the required filters in position, or can be assembled in a laminar flow hood or clean area. When the filters are in position, a shrink cellulose band or adhesive tape should be applied to cassette joints to prevent air leakage.

5.2.1 TEM Cassette Requirements

Commercially available field monitors, comprising 25 mm diameter three-piece cassettes, with conductive extension cowls shall be used for sample collection. The cassette must be new and not previously used. The cassette shall be loaded with an MCE filter of pore size 0.45 µm, and supplied from a lot number which has been qualified as low background for asbestos determination. The cowls should be constructed of electrically conducting material to minimize electrostatic effects. The filter shall be backed by a 5 µm pore size MCE filter (Figure 1, Appendix B).

5.2.2 PCM Cassette Requirements

NIOSH Method 7400, PCM involves using a 0.8 to 1.2 µm mixed cellulose ester membrane, 25 mm diameter, 50 mm conductive cowl on cassette (Figure 2, Appendix B). Some labs are able to perform PCM and TEM analysis on the same filter; however, this should be discussed with the laboratory prior to sampling.

5.3 Other Equipment

C Inert tubing with glass cyclone and hose barb
C Whirlbags (plastic bags) for cassettes
C Tools - small screw drivers
C Container - to keep samples upright
C Generator or electrical outlet (may not be required)
C Extension cords (may not be required)
C Multiple plug outlet
C Sample labels
C Air data sheets
C Chain of Custody records

6.0 REAGENTS

Reagents are not required for the preservation of asbestos samples.

7.0 PROCEDURES

7.1 Air Volumes and Flow Rates

Sampling volumes are determined on the basis of how many fibers need to be collected for reliable measurements. Therefore, one must estimate how many airborne fibers may be in the sampling location.

Since the concentration of airborne aerosol contaminants will have some effect on the sample, the following is a suggested criteria to assist in selecting a flow rate based on real-time aerosol monitor (RAM) readings in milligrams/cubic meter (mg/m^3).

	Concentration	Flow Rate
C Low RAM readings:	<6.0 mg/m^3	11-15. L/min
C Medium RAM readings:	>6.0 mg/m_3	7.5 L/min
C High RAM readings:	>10. mg/m^3	2.5 L/min

In practice, pumps that are available for environmental sampling at remote locations operate under a maximum load of approximately 12 L/min.

7.1.1 U.S. EPA's Superfund Method

The Superfund Method incorporates an indirect preparation procedure to provide flexibility in the amount of deposit that be can be tolerated on the sample filter and to allow for the selective concentration of asbestos prior to analysis. To minimize contributions to background contamination from asbestos present in the plastic matrices of membrane filters while allowing for sufficient quantities of asbestos to be collected, this method also requires the collection of a larger volume of air per unit area of filter than has traditionally been collected for asbestos analysis. Due to the need to collect large volumes of air, higher sampling flow rates are recommended in this method than have generally been employed for asbestos sampling in the past. As an alternative, samples may be collected over longer time intervals. However, this restricts the flexibility required to allow samples to be collected while uniform meteorological conditions prevail.

The sampling rate and the period of sampling should be selected to yield as high a sampled volume as possible, which will minimize the influence of filter contamination. Wherever possible, a volume of 15 cubic meters (15,000 L) shall be sampled for those samples intended for analysis only by the indirect TEM preparation method (Phase 1 samples). For those samples to be prepared by both the indirect and the direct specimen preparation methods (Phase 2 samples), the volumes must be adjusted so as to provide a suitably-loaded filter for the direct TEM preparation method. One option is to collect filters at several loadings to bracket the estimated optimum loading for a particular site. Such filters can be screened in the laboratory so that only those filters closest to optimal loading are analyzed. It has been found that the volume cannot normally exceed 5 cubic meters (5000 L) in an urban or agricultural area, and 10 cubic meters (10,000 L) in a rural area for samples collected on a 25 mm filter and prepared by a direct-transfer technique.

An upper limit to the range of acceptable flow rates for this method is 15 L/min. At many locations, wind patterns exhibit strong diurnal variations. Therefore, intermittent sampling (sampling over a fixed time interval repeated over several days) may be necessary to accumulate 20 hours of sampling time over constant wind conditions. Other sampling objectives also may necessitate intermittent sampling. The objective is to design a sampling schedule so that samples are collected under uniform conditions throughout the sampling interval. This method provides for such options. Air volumes collected on Phase I samples are maximized (<16 L/min). Air volumes collected on Phase 2 samples are limited to provide optimum loading for filters to be prepared by a direct-transfer procedure.

7.1.2 U.S. EPA's Modified Yamate Method for TEM

U.S. EPA's TEM method requires a minimum volume of 560 L and a maximum volume of 3,800 L in order to obtain an analytical sensitivity of 0.005 structures/cc. The optimal volume for TEM is 1200 L to 1800 L. These volumes are determined using a 200 mesh EM grid opening with a 25-mm filter cassette. Changes in volume would be necessary if a 37-mm filter cassette is used since the effective area of a 25 mm (385 sq mm) and 37 mm (855 sq m) differ.

7.1.3 NIOSH Method for TEM and PCM

The minimum recommended volume for TEM and PCM is 400 L at 0.1 fiber/cc. Sampling time is adjusted to obtain optimum fiber loading on the filter. A sampling rate of 1 to 4 L/min for eight hours (700 to 2800 L) is appropriate in non-dusty atmospheres containing 0.1 fiber/cc. Dusty atmospheres i.e., areas with high levels of asbestos, require smaller sample volumes (<400 L) to obtain countable samples.

In such cases, take short, consecutive samples and average the results over the total collection time. For documenting episodic exposures, use high flow rates (7 to 16 L/min) over shorter sampling times. In relatively clean atmospheres where targeted fiber concentrations are much less than 0.1 fiber/cc, use larger sample volumes (3,000 to 10,000 L) to achieve quantifiable loadings. Take care, however, not to overload the filter with background dust. If > 50% of the filter surface is covered with particles, the filter may be too overloaded to count and will bias the measured fiber concentration. Do not exceed 0.5 mg total dust loading on the filter.

7.2 Calibration Procedures

In order to determine if a sampling pump is measuring the flow rate or volume of air correctly, it is necessary to calibrate the instrument. Sampling pumps should be calibrated immediately before and after each use. Preliminary calibration should be conducted using a primary calibrator such as a soap bubble type calibrator, (e.g., a Buck Calibrator, Gilibrator, or equivalent primary calibrator) with a representative filter cassette installed between the pump and the calibrator. The representative sampling cassette can be reused for calibrating other pumps that will be used for asbestos sampling. The same cassette lot used for sampling should also be used for the calibration. A sticker should be affixed to the outside of the extension cowl marked "Calibration Cassette."

A rotameter can be used provided it has been recently precalibrated with a primary calibrator. Three separate constant flow calibration readings should be obtained both before sampling and after sampling. Should the flow rate change by more than 5% during the sampling period, the average of the pre- and post-calibration rates will be used to calculate the total sample volume. The sampling pump used shall provide a non-fluctuating air-flow through the filter, and shall maintain the initial volume flow-rate to within ± 10% throughout the sampling period. The mean value of these flow-rate measurements shall be used to calculate the total air volume sampled. A constant flow or critical orifice controlled pump meets these requirements. If at any time the measurement indicates that the flow-rate has decreased by more than 30%, the sampling shall be terminated. Flexible tubing is used to connect the filter cassette to the sampling pump.Sampling pumps can be calibrated prior to coming on-site so that time is saved when performing on-site calibration.

7.2.1 Calibrating a Personal Sampling Pump with an Electronic Calibrator

1. See Manufacturer's manual for operational instructions.

2. Set up the calibration train as shown in (Figure 3, Appendix B) using a sampling pump, electronic calibrator, and a representative filter cassette. The same lot sampling cassette used for sampling should also be used for calibrating.

3. To set up the calibration train, attach one end of the PVC tubing (approx. 2 foot) to the cassette base; attach the other end of the tubing to the inlet plug on the pump. Another piece of tubing is attached from the cassette cap to the electronic calibrator.

4. Turn the electronic calibrator and sampling pump on. Create a bubble at the bottom of the flow chamber by pressing the bubble initiate button. The bubble should rise to the top of the flow chamber. After the bubble runs its course, the flow rate is shown on the LED display.

5. Turn the flow adjust screw or knob on the pump until the desired flow rate is attained.

6. Perform the calibration three times until the desired flow rate of ± 5% is attained.

7.2.2 Calibrating a Rotameter with an Electronic Calibrator

1. See manufacturer's manual for operational instructions.

2. Set up the calibration train as shown in (Figure 4, Appendix B) using a sampling pump, rotameter, and electronic calibrator.

3. Assemble the base of the flow meter with the screw provided and tighten in place. The flow meter should be mounted within 6º vertical.

4. Turn the electronic calibrator and sampling pump on.

5. Create a bubble at the bottom of the flow chamber by pressing the bubble initiate button. The bubble should rise to the top of the flow chamber. After the bubble runs its course, the flow rate is shown on the LED display.

6. Turn the flow adjust screw or knob on the pump until the desired flow rate is attained.

7. Record the electronic calibrator flow rate reading and the corresponding rotameter reading. Indicate these values on the rotameter (sticker). The rotameter should be able to work within the desired flow range. Readings can also be calibrated for 10 cm^3 increments for Low Flow rotameters, 500 cm^3 increments for medium flow rotameters and 1 liter increments for high flow rotameters.

8. Perform the calibration three times until the desired flow rate of ± 5% is attained. Once on site, a secondary calibrator, i.e., rotameter may be used to calibrate sampling pumps.

7.2.3 Calibrating a Personal Sampling Pump with a Rotameter

1. See manufacturer's manual for Rotameter's Operational Instructions.

2. Set up the calibration train as shown in (Figure 5, Appendix B) using a rotameter, sampling pump, and a representative sampling cassette.

3. To set up the calibration train, attach one end of the PVC tubing (approx. 2 ft) to the cassette base; attach the other end of the tubing to the inlet plug on the pump. Another piece of tubing is attached from the cassette cap to the rotameter.

4. Assemble the base of the flow meter with the screw provided and tighten in place. The flow meter should be mounted within 6° vertical.

5. Turn the sampling pump on.

6. Turn the flow adjust screw (or knob) on the personal sampling pump until the float ball on the rotameter is lined up with the precalibrated flow rate value. A sticker on the rotameter should indicate this value.

7. A verification of calibration is generally performed on-site in the clean zone immediately prior to the sampling.

7.3. Meteorology

It is recommended that a meteorological station be established. If possible, sample after two to three days of dry weather and when the wind conditions are at 10 mph or greater. Record wind speed, wind direction, temperature, and pressure in a field logbook. Wind direction is particularly important when monitoring for asbestos downwind from a fixed source.

7.4 Ambient Sampling Procedures

7.4.1 Pre-site Sampling Preparation

1. Determine the extent of the sampling effort, the sampling methods to be employed, and the types and amounts of equipment and supplies needed.

2. Obtain necessary sampling equipment and ensure it is in working order and fully charged (if necessary).

3. Perform a general site survey prior to site entry in accordance with the site specific Health and Safety plan.

4. Once on-site the calibration is performed in the clean zone. The calibration procedures are listed in Section 7.2.

5. After calibrating the sampling pump, mobilize to the sampling location.

7.4.2 Site Sampling

1. To set up the sampling train, attach the air intake hose to the cassette base. Remove the cassette cap (Figure 6 and 7, Appendix B). The cassette should be positioned downward, perpendicular to the wind

2. If AC or DC electricity is required then turn it on. If used, the generator should be placed 10 ft. downwind from the sampling pump.

3. Record the following in a field logbook: date, time, location, sample identification number, pump number, flow rate, and cumulative time.

4. Turn the pump on. Should intermittent sampling be required, sampling filters must be covered between active periods of sampling. To cover the sample filter: turn the cassette to face upward, place the cassette cap on the cassette, remove the inlet plug from the cassette cap, attach a rotameter to the inlet opening of the cassette cap to measure the flow rate, turn off the sampling pump, place the inlet plug into the inlet opening on the cassette cap. To resume sampling: remove the inlet plug, turn on the sampling pump, attach a rotameter to measure the flow rate, remove the cassette cap, replace the inlet plug in the cassette cap and invert the cassette, face downward and perpendicular to the wind.

5. Check the pump at sampling midpoint if sampling is longer than 4 hours. The generators may need to be regased depending on tank size. If a filter darkens in appearance or if loose dust is seen in the filter, a second sample should be started.

6. At the end of the sampling period, orient the cassette up, turn the pump off.

7. Check the flow rate as shown in Section 7.2.3. When sampling open-faced, the sampling cap should be replaced before post calibrating. Use the same cassette used for sampling for post calibration (increase dust/fiber loading may have altered the flow rate.

8. Record the post flow rate.

9. Record the cumulative time or run.

10. Remove the tubing from the sampling cassette. Still holding the cassette upright, replace the inlet plug on the cassette cap and the outlet plug on the cassette base.

7.4.3. Post Site Sampling

1. Follow handling procedures in Section 3.2, steps 1-4.

2. Obtain an electronic or hard copy of meteorological data which occurred during the sampling event. Record weather: wind speed, ambient temperature, wind direction, and precipitation. Obtaining weather data several days prior to the sampling event can also be useful.

7.5 Indoor Sampling Procedures

PCM analysis is used for indoor air samples. When analysis shows total fiber count above the OSHA action level 0.1 f/cc then TEM (U.S. EPA's Modified Yamate Method) is used to identify asbestos from non-asbestos fibers.

Sampling pumps should be placed four to five feet above ground level away from obstructions that may influence air flow. The pump can be placed on a table or counter. Refer to Table 2 (Appendix A) for a summary of indoor sampling locations and rationale for selection.

Indoor sampling utilizes high flow rates to increased sample volumes (2000 L for PCM and 2800 to 4200 L for TEM) in order to obtain lower detection limits below the standard, (i.e., 0.01 f/cc or lower [PCM] and 0.005 structures/cc or lower [TEM]).

7.5.1 Aggressive Sampling Procedures

Sampling equipment at fixed locations may fail to detect the presence of asbestos fibers. Due to limited air movement, many fibers may settle out of the air onto the floor and other surfaces and may not be captured on the filter. In the past, an 8-hour sampling period was recommended to cover various air circulation conditions. A quicker and more effective way to capture asbestos fibers is to circulate the air artificially so that the fibers remain airborne during sampling. The results from this sampling option typifies worst case condition. This is referred to as aggressive air sampling for asbestos. Refer to Table 2 for sample station locations.

1. Before starting the sampling pumps, direct forced air (such as a 1-horsepower leaf blower or large fan) against walls, ceilings, floors, ledges, and other surfaces in the room to initially dislodge fibers from surfaces. This should take at least 5 minutes per 1000 sq. ft. of floor.

2. Place a 20-inch fan in the center of the room. (Use one fan per 10,000 cubic feet of room space.) Place the fan on slow speed and point it toward the ceiling.

3. Follow procedures in Section 7.4.1 and 7.4.2 (Turn off the pump and then the fan(s) when sampling is complete.).

4. Follow handling procedures in Section 3.2, steps 1-4.

8.0 CALCULATIONS

The sample volume is calculated from the average flow rate of the pump multiplied by the number of minutes the pump was running (volume = flow rate X time in minutes). The sample volume should be submitted to the laboratory and identified on the chain of custody for each sample (zero for lot, field and trip blanks).

The concentration result is calculated using the sample volume and the numbers of asbestos structures reported after the application of the cluster and matrix counting criteria.

9.0 QUALITY ASSURANCE/ QUALITY CONTROL

Follow all QA/QC requirements from the laboratories as well as the analytical methods.

9.1 TEM Requirements

1. Examine lot blanks to determine the background asbestos structure concentration.

2. Examine field blanks to determine whether there is contamination by extraneous asbestos structures during specimen preparation.

3. Examine of laboratory blanks to determine if contamination is being introduced during critical phases of the laboratory program.

4. To determine if the laboratory can satisfactorily analyze samples of known asbestos structure concentrations, reference filters shall be examined. Reference filters should be maintained as part of the laboratory's Quality Assurance program.

5. To minimize subjective effects, some specimens should be recounted by a different microscopist.

6. Asbestos laboratories shall be accredited by the National Voluntary Laboratory Accreditation Program.

7. At this time, performance evaluation samples for asbestos in air are not available for Removal Program Activities.

9.2 PCM Requirements

1. Examine reference slides of known concentration to determine the analyst's ability to satisfactorily count fibers. Reference slides should be maintained as part of the laboratory's quality assurance program.

2. Examine field blanks to determine if there is contamination by extraneous structures during sample handling.

3. Some samples should be relabeled then submitted for counting by the same analyst to determine possible bias by the analyst.

4. Participation in a proficiency testing program such as the AIHA-NIOSH proficiency analytical testing (PAT) program.

10.0 DATA VALIDATION

Results of quality control samples will be evaluated for contamination. This information will be utilized to qualify the environmental sample results accordingly with the project's data quality objectives.

11.0 HEALTH AND SAFETY

When working with potentially hazardous materials, follow U.S. EPA, OSHA, and corporate health and safety procedures. More specifically, when entering an unknown situation involving asbestos, a powered air purifying respirator (PAPR) (full face-piece) is necessary in conjunction with HEPA filter cartridges. See applicable regulations for action level, PEL, TLV, etc. If previous sampling indicates asbestos concentrations are below personal health and safety levels, then Level D personal protection is adequate.

12.0 REFERENCES

(1) Environmental Asbestos Assessment Manual, Superfund Method for the Determination of Asbestos in Ambient Air, Part 1: Method, EPA/540/2-90/005a, May 1990, and Part 2: Technical Background Document, EPA/540/2-90/005b, May 1990.

(2) Methodology for the Measurement of Airborne Asbestos by Electron Microscopy, EPA's Report No. 68-02-3266, 1984, G. Yamate, S.C. Agarwal, and R. D. Gibbons.

(3) National Institute for Occupational Safety and Health. NIOSH Manual of Analytical Method. Third Edition. 1987.

(4) U.S. Environmental Protection Agency. Code of Federal Regulations 40 CFR 763. July 1, 1987. Code of Federal Regulations 40 CFR 763 Addendum. October 30, 1987.

(5) U.S. Environmental Protection Agency. Asbestos-Containing Materials in Schools; Final Rule and Notice. 52 FR 41826.

(6) Occupational Safety and Health Administration. Code of Federal Regulations 29 CFR 1910.1001. Washington, D.C. 1987.

APPENDIX A

Tables

TABLE 1. SAMPLE STATIONS FOR OUTDOOR SAMPLING		
Sample Station Location	Sample Numbers	Rationale
Upwind/Background[1]	Collect a minimum of two simultaneous upwind/background samples 30º apart from the prevailing windlines.	Establishes background fiber levels.
Downwind	Deploy a minimum of 3 sampling stations in a 180 degree arc downwind from the source.	Indicates if asbestos is leaving the site.
Site Representative and/or Worst Case	Obtain one site representative sample which shows average condition on-site or obtain worst case sample (optional).	Verify and continually confirm and document selection of proper levels of worker protection.

(1) More than one background station may be required if the asbestos originates from different sources.

APPENDIX A (Cont'd)

Tables

TABLE 2

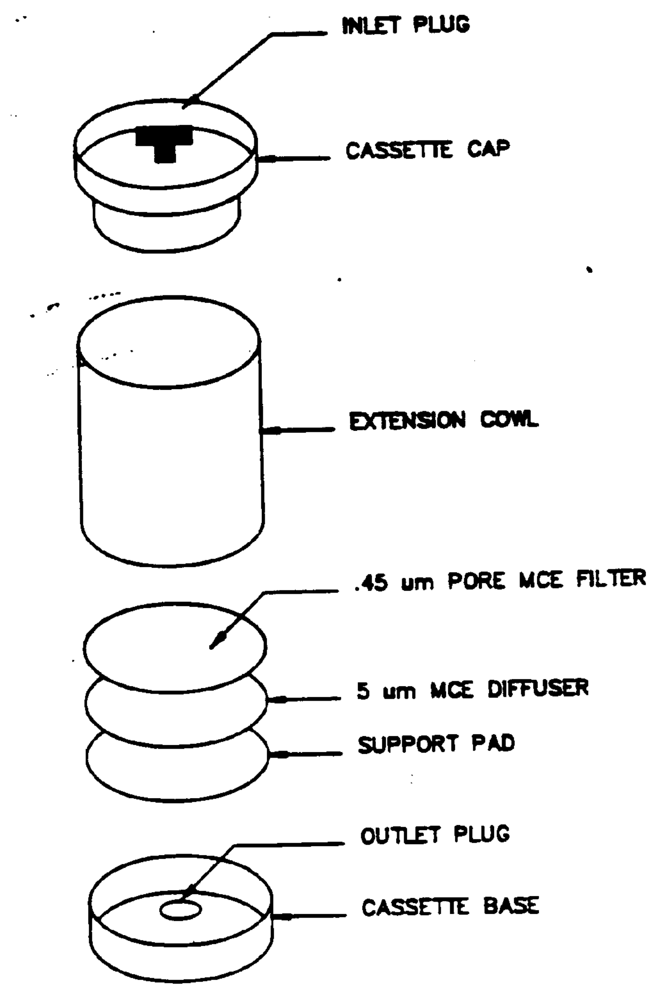
SAMPLE STATIONS FOR INDOOR SAMPLING

Sample Station Location	Sample Numbers	Rationale
Indoor Sampling	If a work site is a single room, disperse 5 samplers throughout the room. If the work site contains up to 5 rooms, place at least one sampler in each room. If the work site contains more than 5 rooms, select a representative sample of the rooms.	Establishes representative samples from a homogeneous area.
Upwind/Background	If outside sources are suspected, deploy a minimum of two simultaneous upwind/background samples 30^{o} apart from the prevailing windlines.	Establish whether indoor asbestos concentrations are coming from an outside source.
Worst Case	Obtain one worst case sample, i.e., aggressive sampling (optional).	Verify and continually confirm and document selection of proper levels of worker protection.

APPENDIX B

Figures

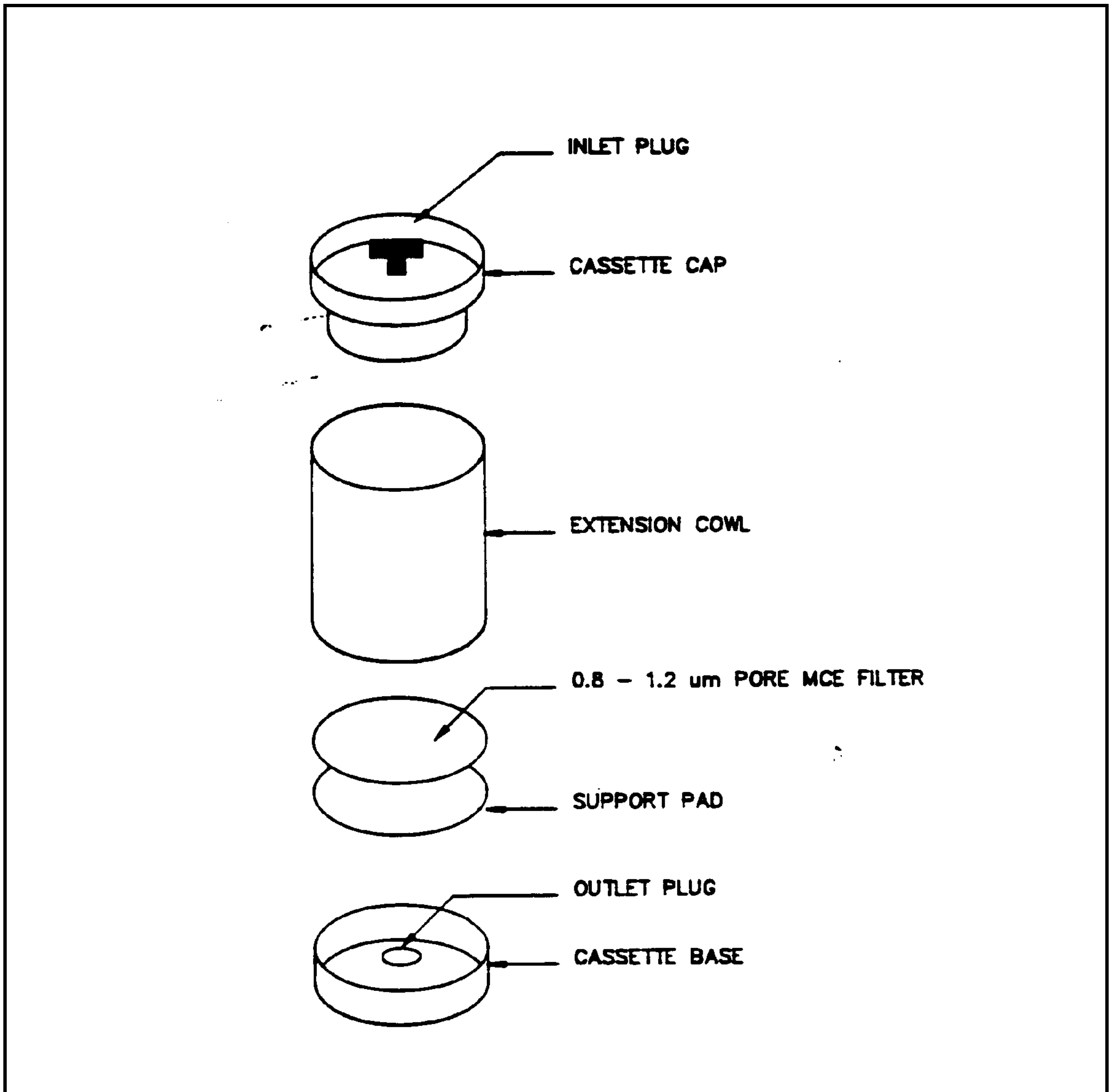
FIGURE 1. Transmission Electron Microscopy Filter Cassette



APPENDIX B (Cont'd)

Figures

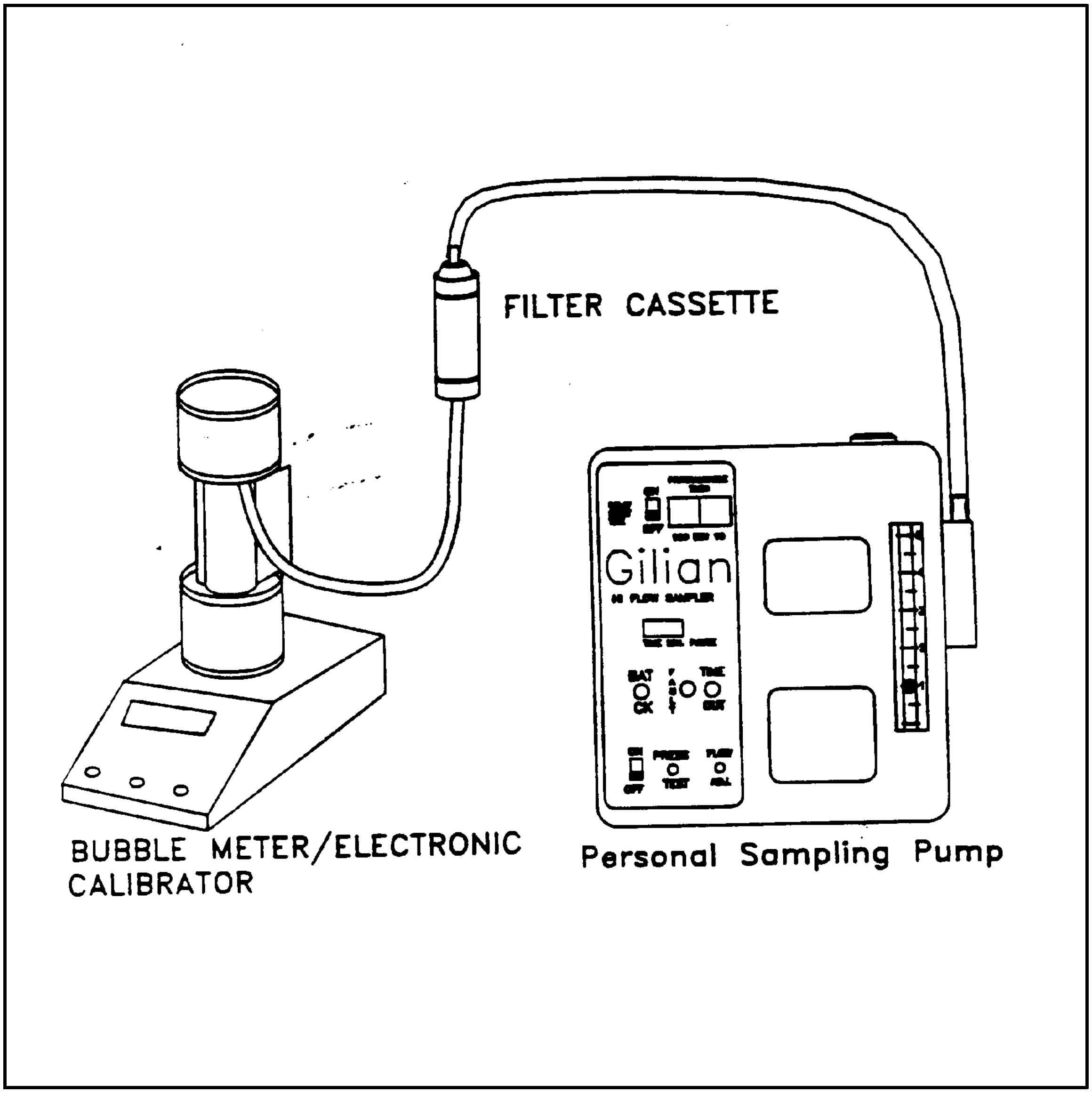
FIGURE 2. Phase Contrast Microscopy Filter Cassette



APPENDIX B (Cont'd)

Figures

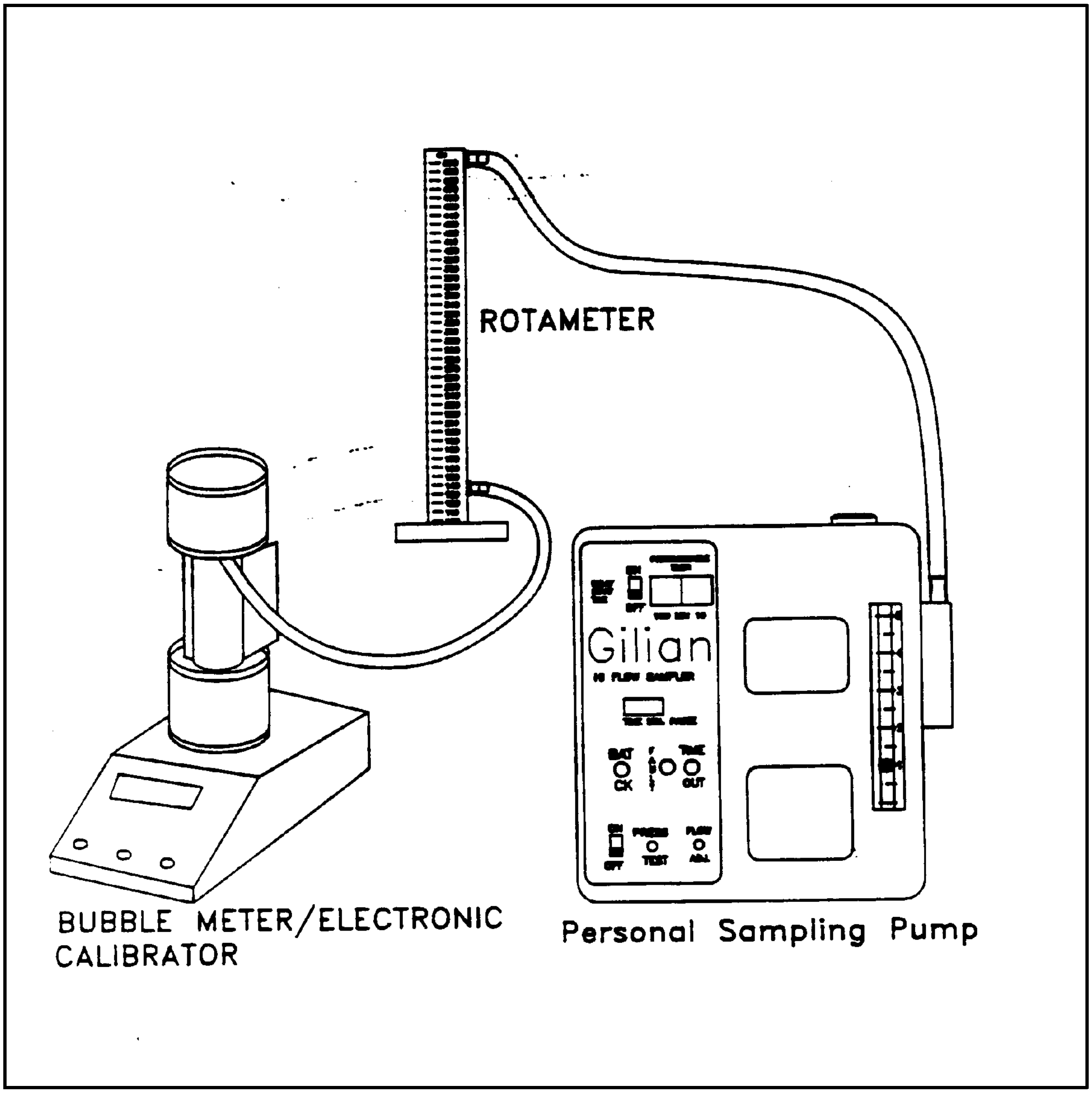
FIGURE 3. Calibrating a Personal Sampling Pump with a Bubble Meter



APPENDIX B (Cont'd)

Figures

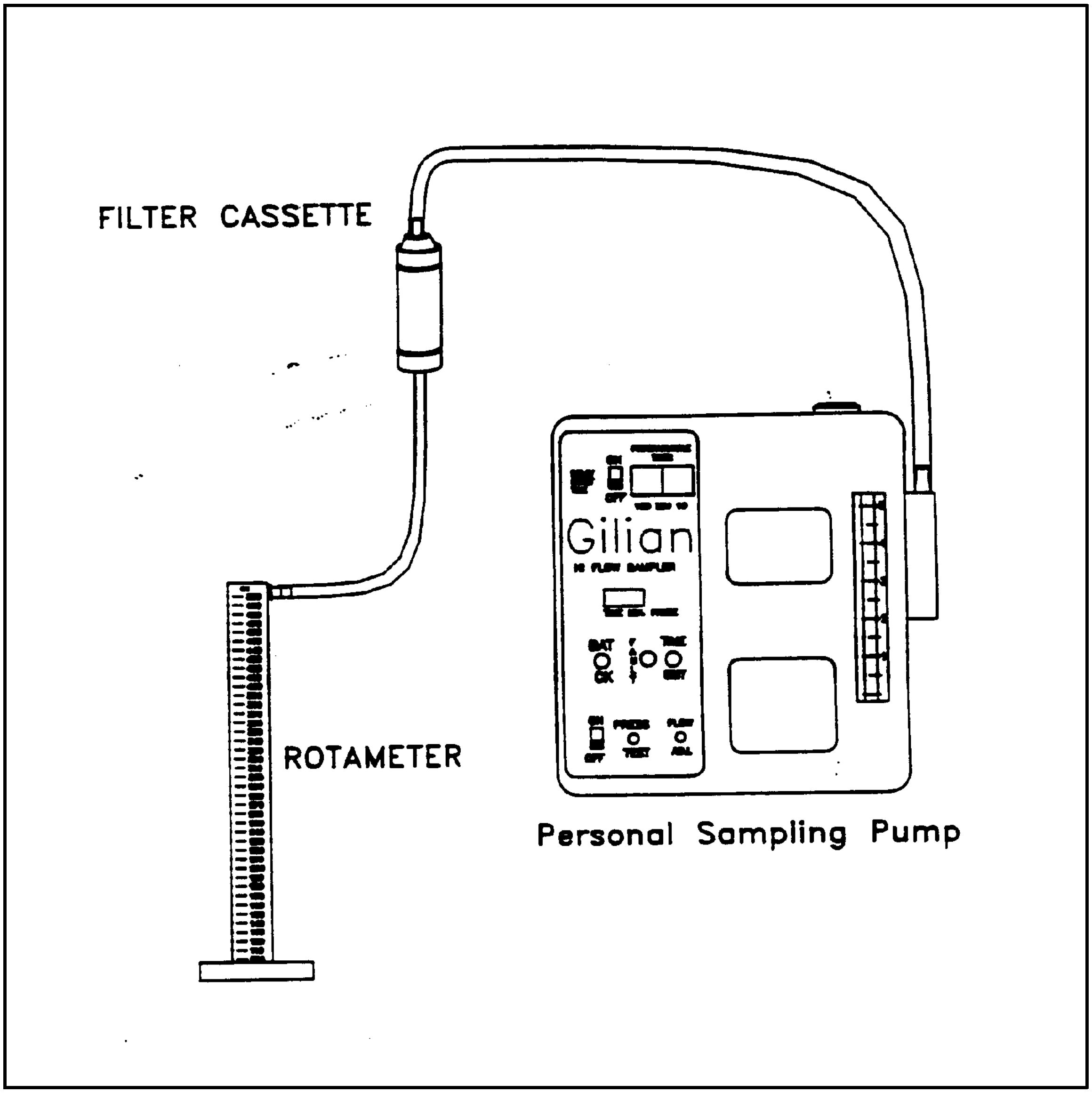
FIGURE 4. Calibrating a Rotameter with a Bubble Meter



APPENDIX B (Cont'd)

Figures

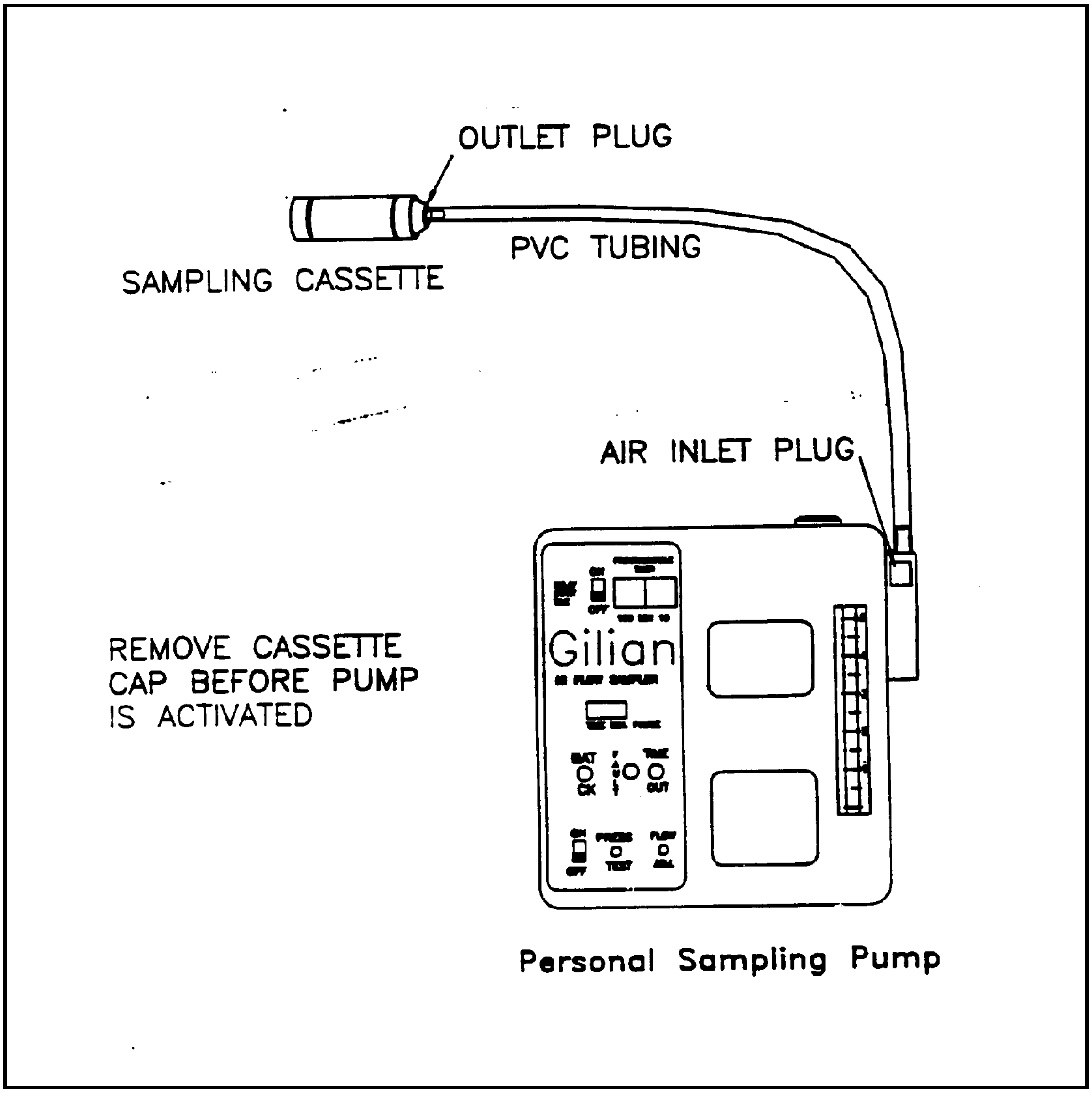
FIGURE 5. Calibrating a Sampling Pump with a Rotameter



APPENDIX B (Cont'd)

Figures

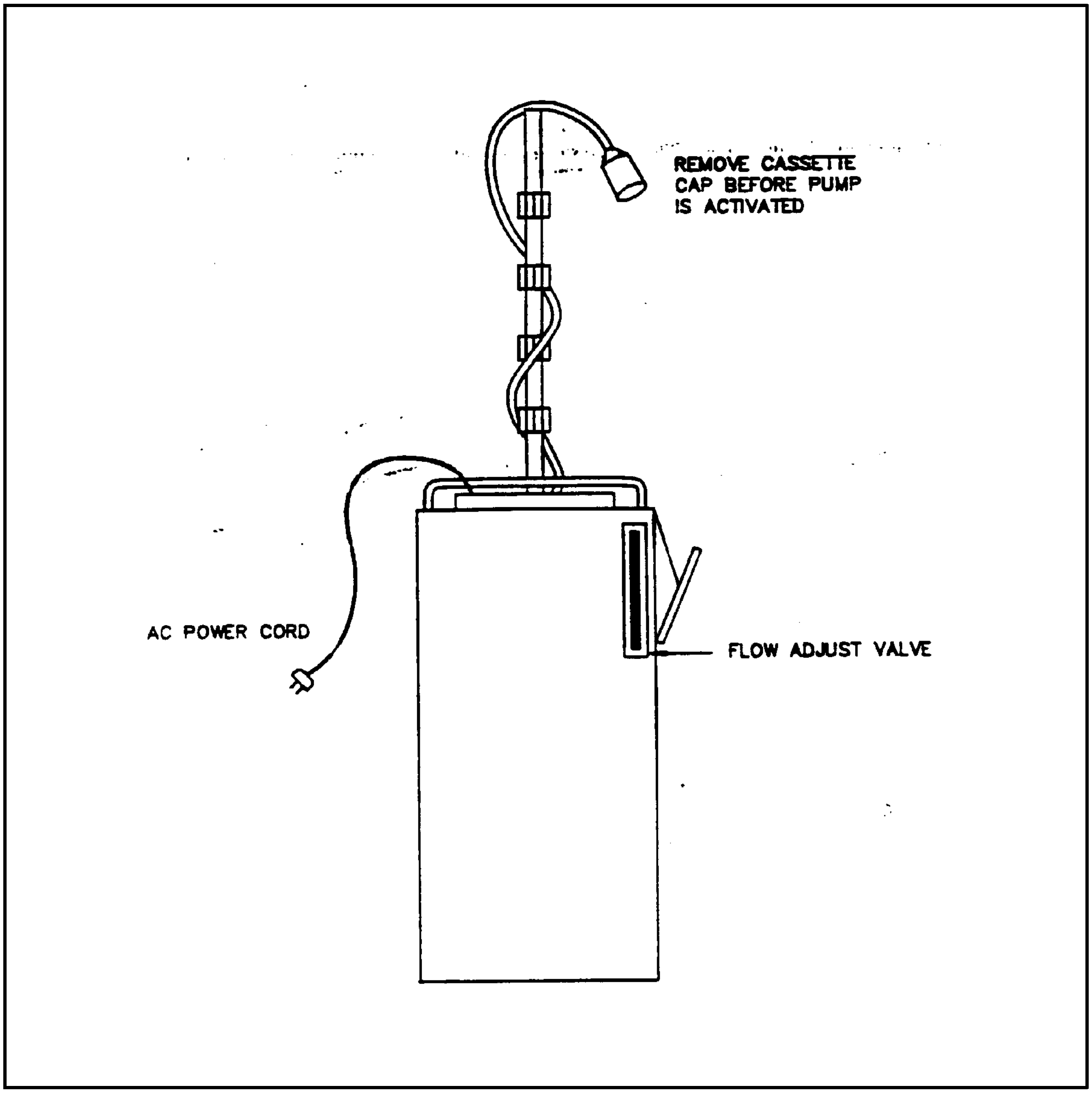
FIGURE 6. Personal Sampling Train for Asbestos



APPENDIX B (Cont'd)

Figures

FIGURE 7. High Flow Sampling Train for Asbestos



APPENDIX G

LABORATORY QUALITY ASSURANCE/QUALITY CONTROL PROCEDURES

This section describes standard methods for the laboratory quality assurance/quality control (QA/QC) procedures that will be followed for the analyses of soil and dust samples collected during the Troy asbestos property evaluation (TAPE) project. The purpose of the laboratory QA/QC is to ensure generation of high-quality, scientifically valid, and legally defensible data that meet the objectives of the TAPE project. The overall TAPE project objective is to produce well-documented data of known quality. Data quality will be measured in terms of the data's reporting limits, precision and accuracy, completeness, representativeness, and comparability. These parameters are discussed in detail in Section 7 of the TAPE work plan.

1.0 LABORATORY QA/QC

The Laboratory QA activities include all processes and procedures that have been designed to ensure that data generated by an analytical laboratory are of high quality, and that any problems in sample preparation or analysis that may occur in the laboratory are quickly identified and rectified. Tetra Tech EMI will only be involved with laboratory QA through their collection of field QC samples that will be prepared and processed in the same manner as all field samples. The following sections describe the components of the laboratory QA/QC program to be implemented for the Troy site.

Section 1.1 Laboratory Quality Control Samples

A variety of laboratory-based QA/QC analyses are performed to help establish the quality of data obtained by TEM, PCM and PLM, as discussed below.

Laboratory QC Samples for TEM

The QC requirements for TEM analyses at the Libby site are patterned after the requirements set forth by NVLAP. The types of laboratory QC samples for TEM include the following:

- Laboratory blanks
- Re-analysis (same grid openings, same analyst)
- Re-analysis (same grid openings, different analyst)
- Interlab (same grid openings, different laboratory)
- Repreparation (new grid and grid openings)

Laboratory Modification LB-000029 summarizes the project-specific TEM QC frequency rate, type, and acceptance criteria for all participating laboratories.

Laboratory QC Samples for PCM

Laboratory-based QC samples for PCM are based on the requirements specified by AIHA. This includes daily checks of microscope resolution, daily analysis of one or more reference slides (slides analyzed repeatedly over time to determine each analyst's precision), and re-analysis of at least 10% (a minimum of 1 per day) of all field samples.

Laboratory QC Samples for PLM

Laboratory-based QC for PLM is based on the requirements specified by NIST/NVLAP. This includes daily evaluation of various blanks to check for contamination. Overall QC analysis is at a rate of at least 10%, including inter- and intra-analyst reanalyses, inter-lab and blank analysis.

Section 1.2 Training

Initial Mentoring

In order to ensure that new laboratories are properly trained to perform reliable analyses at the Troy site, a program was established in which laboratories that are experienced with the analysis of LA provide training and mentoring to the new laboratories prior to their involvement with the analysis of Libby field samples. All new laboratories are required to participate in the mentorship/training program. The training program includes a rigorous 2-3 day period of on-site training provided by senior personnel from those laboratories that are highly experienced with the Libby project. The tutorial process includes a review of morphological, optical, chemical, and electron diffraction characteristics of LA, as well as training on the project-specific analytical methodology, documentation, and administrative procedures required for the Libby site.

Site-Specific Reference Materials

Because LA is not a common form of asbestos, the US Geological Survey (USGS) developed three site-specific reference materials using LA collected at the Libby mine site. Upon entry into the program, each laboratory was provided samples of these LA reference materials. Each laboratory analyzed multiple structures present in these samples by TEM in order to become familiar with the physical and chemical appearance of LA, and to establish a reference library of LA EDS spectra. These laboratory-specific and instrument-specific reference spectra serve to guide the classification of particles observed in field samples.

Weekly Technical Discussions

To ensure that all laboratories are aware of any technical or procedural issues that may arise, a weekly teleconference is held between EPA, their contractors, and each of the participating laboratories. Other experts (e.g., USGS) are invited to participate when needed. These calls cover all aspects of the analytical process, including sample flow, information processing, technical issues, analytical method procedures and development, documentation issues, project-specific laboratory modifications, and pertinent asbestos publications.

Section 1.3 Data Recording

Standardized data entry spreadsheets (electronic data deliverables, or EDDs) have been developed specifically for the Libby project to ensure consistency between laboratories in the presentation and submittal of analytical data. These EDDs shall be used in Troy as well. In general, a unique EDD has been developed for each type of analytical method (TEM, PCM, PLM).

Each EDD contains a variety of built-in QC functions that improve the accuracy of data entry and help maintain data integrity. For example, data entry forms utilize drop-down menus whenever possible to standardize data inputs and prevent transcription errors. In addition, many data input cells are coded to highlight omissions, apparent inconsistencies, or unexpected values so that data entry personnel can check and correct any errors before submittal of the EDD. These spreadsheets also perform automatic computations of sensitivity, dilution factors, and concentration, thus reducing the likelihood of analyst calculation errors. The EDD is uploaded directly uploaded into the project database, avoiding any additional data entry requirements.

Section 1.4 Laboratory Modification Forms

When changes or revisions are needed to improve methods or procedures used for analysis of LA, these changes are documented using the laboratory modification process. Figure XX (EPA please provide) provides an example of the laboratory modification form. The laboratory modification form provides a standardized format for tracking procedural changes in sample analysis and allows project managers to assess potential impacts on the quality of the data being collected. As seen, the laboratory modification form contains the following information:

- the title of the analytical method being modified
- a description of the process change
- the known or estimated impacts to data quality, including a list of potentially impacted sample IDs as appropriate
- the name of the individual requesting the modification
- the dates the modification was implemented (may be temporary or permanent)
- the technical reviewer approval signature and date of review
- the QA reviewer approval signature and date of review

The laboratory modification forms are controlled and maintained by EPA's laboratory contractor at Libby (CDM).

Section 1.5 Laboratory Audits

Each Libby laboratory is required to participate in an on-site laboratory audit carried out by the EPA Superfund Analytical Services Branch (ASB). These audits are performed by EPA personnel (and their contractors) external to and independent of the Libby team members.

Section 1.6 Laboratory Monitoring

Laboratory monitoring for the occurrence of contamination is a continual process that covers every aspect of the laboratory process.

Blank checks are performed routinely during PLM analysis by dipping scalpels, probes, tweezers etc. in dispersion staining oils and analyzing for asbestos. Lab blanks serve as a check for contamination of tools and equipment. Negative field blanks are actually a confirmation of lack of asbestos contamination as well. If asbestos is detected, corrective actions are implemented including wipe downs of equipment and work areas and an attempt to isolate the source. Corrective actions continue until follow up blank results are negative for asbestos.

TEM air samples are collected in the lab and analyzed by AHERA methodology for asbestos. If ANY asbestos is detected corrective action is taken. This includes a clean up of the area by HEPA vacuum and or wet wiping. An attempt to isolate the source should also take place to minimize the chance of repeat contamination.

Section 1.7 Analytical Verification and Consistency Reviews – EPA, who does this? Volpe, TtEMI????

In accord with the TEM Verification SOP (REF – EPA provide), a minimum of 10% of all TEM analyses is required. The basic steps in this process include the selection of TEM analyses that will undergo a data consistency review and verification, performing a consistency review of the original laboratory TEM bench sheets to verify that TEM analysts working on the Troy project are performing analyses in accord with project-specific recording rules, and verifying the correct transfer of results from the bench sheets into the Libby2 Database. Similar verification and consistency reviews shall be performed for all analyses used in clean up decisions (e.g., PLM). PCM testing is planned for OSHA worker exposure compliance and is required to adhere to OSHA regulations for data adequacy.

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**DRAFT**

**TROY ASBESTOS PROPERTY EVALUATION WORK PLAN**
**(FIELD SAMPLING PLAN AND QUALITY ASSURANCE PROJECT PLAN)**

**FOR THE**

**TROY ASBESTOS PROPERTY EVALUATION PROJECT**

**Troy Operable Unit of the Libby Asbestos Superfund Site**

March 2006

Prepared for:

**MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY**
**Remediation Division**
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Contract Number 402014
Contract Task Order Number 41

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TROY ASBESTOS PROPERTY EVALUATION WORK PLAN
(FIELD SAMPLING PLAN/QUALITY ASSURANCE PROJECT PLAN)

FOR THE

TROY ASBESTOS PROPERTY EVALUATION PROJECT

Prepared for:

MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY

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FIGURES

Figure **Page**

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TABLES

Table **Page**

ACRONYMS AND ABBREVIATIONS

AHERA	Asbestos Hazard Emergency Response Act
amsl	Above mean sea level
ASTM	ASTM International (formerly the American Society for Testing and Materials)
CDM	Camp Dresser & McKee
CERCLA	Comprehensive Environmental Response Compensation and Liability Act
CFR	Code of Federal Regulations
cm^2	Square centimeters
CPR	Cardiopulmonary resuscitation
DEQ	Montana Department of Environmental Quality
DPHHS	Montana Department of Public Health and Human Services
DQO	Data quality objective
eLastic	Electronic Libby Asbestos Sample Tracking Information Center
EPA	U.S. Environmental Protection Agency
FSDS	Field sampling data sheet
GPS	Global positioning system
HASP	Health and safety plan
HAZWOPER	Hazardous waste operations
IFF	Inspection field form
LA	Libby amphibole
Microvac	Microvacuum
mm	Millimeters
OSHA	Occupational Safety and Health Administration
OU	Operable unit
PPE	Personal protective equipment
PLM	Polarized light microscopy
QA	Quality assurance
QC	Quality control
SOP	Standard operating procedure
TAPE	Troy Asbestos Property Evaluation
Tetra Tech	Tetra Tech EM Inc.
µm	Micrometers

ACRONYMS AND ABBREVIATIONS
(continued)

VCI	Vermiculite-containing insulation
Volpe Center	John A. Volpe National Transportation Systems Center

1.0 PROJECT DESCRIPTION AND BACKGROUND

Tetra Tech EM Inc. (Tetra Tech) received Task Order No. 41 from the Montana Department of Environmental Quality, Remediation Division (DEQ), under DEQ Contract No. 402014. The purpose of this task order is to complete a Troy Asbestos Property Evaluation (TAPE) Work Plan for the Troy Operable Unit Number 7 (OU7) of the Libby Asbestos Superfund Site. The United States Environmental Protection Agency (EPA) is the lead agency for the Libby Asbestos Superfund Site. DEQ is the lead agency for the Troy OU7 through a Cooperative Agreement with EPA. EPA requested DEQ lead the Troy OU7 for financial savings and resource allocation. The TAPE Work Plan describes the field and property inspections and sample collection necessary to identify if and where amphibole asbestos is present within the Troy OU7 and the concentrations and quantity, if present. This information will be used at a later date to support cleanup decisions.

This TAPE Work Plan document is a combined field sampling plan and quality assurance project plan and is referred to as the TAPE Work Plan. Tables and figures in this document follow the first reference in the text. Appendix A contains the site-specific health and safety plan (HASP), Appendix B contains copies of project-applicable standard operating procedures (SOPs), Appendix C is a list of equipment and supplies required for the project, Appendix D contains samples of information for residents, and Appendix E contains example TAPE project field forms.

1.1 PROJECT BACKGROUND AND PURPOSE FOR SAMPLING

Troy, Montana, is located 18 miles northwest of Libby, Montana. From the 1920s until 1990, an active vermiculite mine and associated processing operations were located at Libby. While it was in operation, the vermiculite mine in Libby may have produced 80 percent of the world's supply of vermiculite (EPA 2005). Processed and exfoliated vermiculite has been used primarily for insulation in buildings and as a soil amendment. The Libby vermiculite deposit is contaminated with amphibole asbestos. For decades, the processing of vermiculite ore and generation and disposal of waste materials resulted in widespread amphibole asbestos contamination of the Libby community. In 1999, EPA Region 8 dispatched an emergency response team to investigate media reports of amphibole asbestos contamination and high rates of asbestos-related disease in Libby. Subsequent environmental investigations have found many areas in and around Libby contaminated with a form of amphibole asbestos known as Libby amphibole (LA).

The health effects from airborne exposure to the more common commercially used or encountered asbestos mineral forms (chrysotile, tremolite, actinolite, anthophyllite, amosite, crocidolite) include: (1) pleural disease (plaques, diffuse thickening, calcifications, and pleural effusions), (2) interstitial disease (asbestosis), (3) lung cancer, and (4) mesothelioma (a rare cancer of mesothelial cells in the pleura or peritoneum). The observed health effects associated with exposure to asbestiform amphibole fibers (LA) (Meeker, 2003) at the Libby site have been well documented and are clearly consistent illnesses seen with

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the more common asbestos mineral exposures (as noted below).

Studies performed in the early 1980's by researchers from McGill University (McDonald 1986a-b) and the Centers for Disease Control and Prevention (CDC), National Institute for Occupational Safety and Health (NIOSH) (Amandus 1987a-c) found that former employees of the Libby vermiculite mine had significantly increased pulmonary morbidity and mortality from asbestosis and lung malignancies. Researchers at NIOSH who studied the annual chest x-rays of mine and mill workers with at least 5 years tenure (between 1975 and 1982) also found an increased prevalence of the radiographic abnormalities associated with asbestos-related disease. A recent follow-up study of Libby vermiculite workers that were previously evaluated in the 1980's, found that "this small cohort of vermiculite miners, exposed to amphibole fibers in the tremolite series, has suffered severely from both malignant and non-malignant respiratory disease"(McDonald, 2002). The overall proportionate mortality among the group for mesothelioma (4.2%) was extremely high, being similar to that seen for crocidolite (considered by many to be the most toxic form of asbestos) miners in South Africa (4.7%) and Australia (3.9%) (McDonald 2002; McDonald 2004). For comparison, the age-adjusted incidence of mesothelioma in the United States (1992-2002) was about 0.001% (1 case per 100,000) with the occurrence of cases being extremely rare prior to age 50 (SEER, 2005).

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More recent studies completed at the Libby site have also found increased mortality and morbidity among former workers, as well as, others in the community without any direct occupational exposures to the mine or processing activities. A mortality study conducted by investigators from the CDC, Agency for Toxic Substances and Disease Registry (ATSDR) found markedly elevated death rates of asbestosis, lung cancer, and mesothelioma for the Libby Community for the 20-year period examined (1979–1998). Mortality from asbestosis was approximately 40 times higher than the rest of Montana and 60 times higher than the rest of the United States (ATSDR 2000, ATSDR 2002a).

Large-scale medical screening of over 7300 individuals that worked or lived in Libby for at least six months prior to 1990, found significantly increased rates of asbestos-related radiologic abnormalities. Approximately 18% (1186/6668) of the participants with asbestos-related pleural abnormalities were identified by at least 2 out of 3 B-readers. The prevalence of pleural abnormalities increased with increasing exposure pathways, ranging from 6.7% for those who were not able to identify any specific exposure pathways aside from living in Libby to 34.6% for those who reported 12 or more specific exposure pathways. The majority of individuals (>70%) with pleural abnormalities did not directly work for the mine or processing operations, or with any secondary contractors for the mine (Peipins 2003).

Deleted: The vermiculite deposit is contaminated with a form of amphibole asbestos (Libby amphibole [LA]) that is considered a carcinogen. Asbestos is a known carcinogen and is associated with a multitude of respiratory health effects, including asbestosis, lung cancer, and mesothelioma. For decades, vermiculite ore and waste materials were ubiquitous in the Libby community while the mine operated and after its closure. ¶
¶
In 1999, EPA Region 8 dispatched an emergency response team to investigate in response to media reports that described a high rate of asbestos-related deaths in Libby. The Agency for Toxic Substances and Disease Registry (ATSDR) has since determined that between 1978 and 1998 asbestosis mortality in Libby was 40 times to 80 times higher than expected in Montana and the United States, and lung cancer mortality was approximately 20 percent to 30 percent higher than expected in Montana and the United States (ATSDR 2002). Originally believed to be a problem limited to the mine workers, the scope has increased. Subsequent environmental investigations have found many areas in and around Libby contaminated with LA.

EPA began Time Critical Removal Actions in Libby in 1999. EPA began investigations in Libby through a two-phased approach. The Phase I investigation was used to determine if a time critical removal action was warranted in Libby to protect human health, to identify potential major source areas, and to identify the appropriate analytical methods for measuring concentrations of LA in those source materials (CDM 2002). The Phase II investigation was used to collect detailed information about airborne concentrations in air that result from sources of contamination that are disturbed (CDM 2003b). The combined results from the Phase I and II investigation include:

- Exposure to LA is a threat to human health.

- Release of respirable LA fibers occurs when source materials are disturbed.
- Source materials include vermiculite insulation, vermiculite products (building materials) and process wastes, and contaminated soils.
- Contaminated indoor dust found in residential and commercial properties is a potential exposure pathway.
- There is widespread presence of LA throughout the Libby area.

As a result of the findings from the Phase I and II investigations, and because the Libby Asbestos Superfund Site was listed on the National Priorities List in 2002, a further investigation of residences and businesses in the Libby study area boundary was warranted (EPA 2003b). EPA began the Libby Asbestos Superfund Site Contaminant Screening Study, which was considered the first part of the Remedial Investigation, in 2002. The ongoing objective of the Contaminant Screening Study is to obtain information concerning the presence and nature of LA contamination at properties in Libby (CDM 2003a). As of January 2007, EPA and their contractors have investigated approximately 4,000 properties in the Libby area through the Contaminant Screening Study.

The purpose of the TAPE is to characterize the nature and extent of LA source contamination present in the Troy OU7 boundaries. The investigative approach is similar to that of the Contaminant Screening Study carried out in Libby, but makes improvements based on lessons learned from those activities. It is believed that nature of LA contamination, and associated exposure pathways present in Troy are similar to those observed in Libby. Limited investigations thus far have found the vermiculite insulation found in Troy is similar in both morphology and mineralogy to the LA found in Libby (USGS 2005). The draft Troy Conceptual Site Model (Section 1.2) illustrates that potential exposures in Troy are similar to those in Libby OU4, therefore, a systematic screening of Troy area residences, public areas, schools, and businesses is necessary to gather sufficient information to determine how many Troy area properties are contaminated with LA. Some vermiculite mine workers lived in Troy and commuted to the mine to work each day. The mine workers were exposed to asbestos-contaminated materials at the mine and processing facilities, and they transported asbestos-contaminated dust to their homes on clothes and equipment. Residents of Troy also traveled to Libby for everyday activities such as shopping, working (other than at the mine), and attending school sporting events and likely came in contact with LA in Libby during these frequent visits. In addition, the asbestos-contaminated vermiculite ore and waste materials in varying forms may have been used for amending soils (as fill or as a conditioner), building materials (plaster, concrete, or chinking amendment), and for insulating buildings in and around Troy.

Deleted: The goal of the Contaminant Screening Study was (and is) to determine which properties in Libby contained LA source materials

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Comment [CDL1]: Please include other such examples from the CSM – like wood burning, transportation corridors, etc.

Comment [CDL2]: Actually, is all of this language going to be repetitive from the newly revised CSM section and is not necessary???

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1.2 CONCEPTUAL SITE MODEL

Airborne exposure to asbestos is the main exposure route of concern resulting in malignant and non-malignant respiratory diseases. Oral ingestion of asbestos in environmental settings may also be a potential route of exposure and concern. Figure 1-1 presents a draft Conceptual Site Model for Troy, which identifies exposure pathways by which LA asbestos fibers from the Libby mine might be inhaled or ingested by humans. The draft Conceptual Site Model will be refined as additional data are acquired and the understanding of actual transport and exposure pathways for Troy is improved. It is not the intent of this Work Plan to investigate all pathways identified in the Conceptual Site Model. Please see **** (additional figure, another section, etc.) for the specific pathways to be investigated under this Work Plan. Future Work Plans will be prepared to investigate the remaining pathways.

1.3 TROY SITE INFORMATION

The Troy OU7 is located along the Kootenai River valley at an elevation ranging from 1,850 feet above mean sea level (amsl) at the northern end of the OU7 to 2,500 feet amsl on the mountain slopes surrounding the valley. The Troy OU7 is approximately 8 miles long and up to 1.8 miles wide. Topography of the Troy OU7 consists of relatively flat river valley terraces on both sides of a gently graded Kootenai River. Several tributaries flow into the Kootenai River along the 8-mile stretch contained within the Troy OU7. Figure 1-2 provides a topographic view of the Troy OU7 boundaries. The Troy OU7 boundaries were selected based on population density and proximity to the Town of Troy.

Deleted: Properties in Troy are being investigated to evaluate whether sources of LA contamination exist at these properties. Limited investigations thus far have found the vermiculite insulation found in Troy is morphologically similar to that in Libby.¶

Comment [CDL3]: Please include a complete CSM for OU7 similar to that currently used for OU4. The CSM should encompass all possible exposure pathways with descriptive language. Then identify the specific pathway(s) (inhalation) being addressed by this specific Work Plan. See attached document.

Additional comments on the CSM diagram provided by EPA: "Suggest addressing only inhalation pathways for this CSM – in Libby, the inhalation pathway has been prioritized from a risk management standpoint. Additionally, there aren't enough data to characterize the ingestion pathway as minor, nor are all the potential ingestion pathways depicted on the CSM as is stands. The CSM should explicitly include outdoor ambient air and air near disturbed soil (two separ ... [2]

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Deleted: Asbestos exposure is a potential human health concern because chronic inhalation of excessive levels of asbestos fibers suspended in air can result in ... [3]

Deleted: Site Conceptual Model

Comment [CDL4]: I see having two CSM's – or one large one with certain boxes shaded or colored. We need to be very CLEAR on which pathways this TAPE covers.

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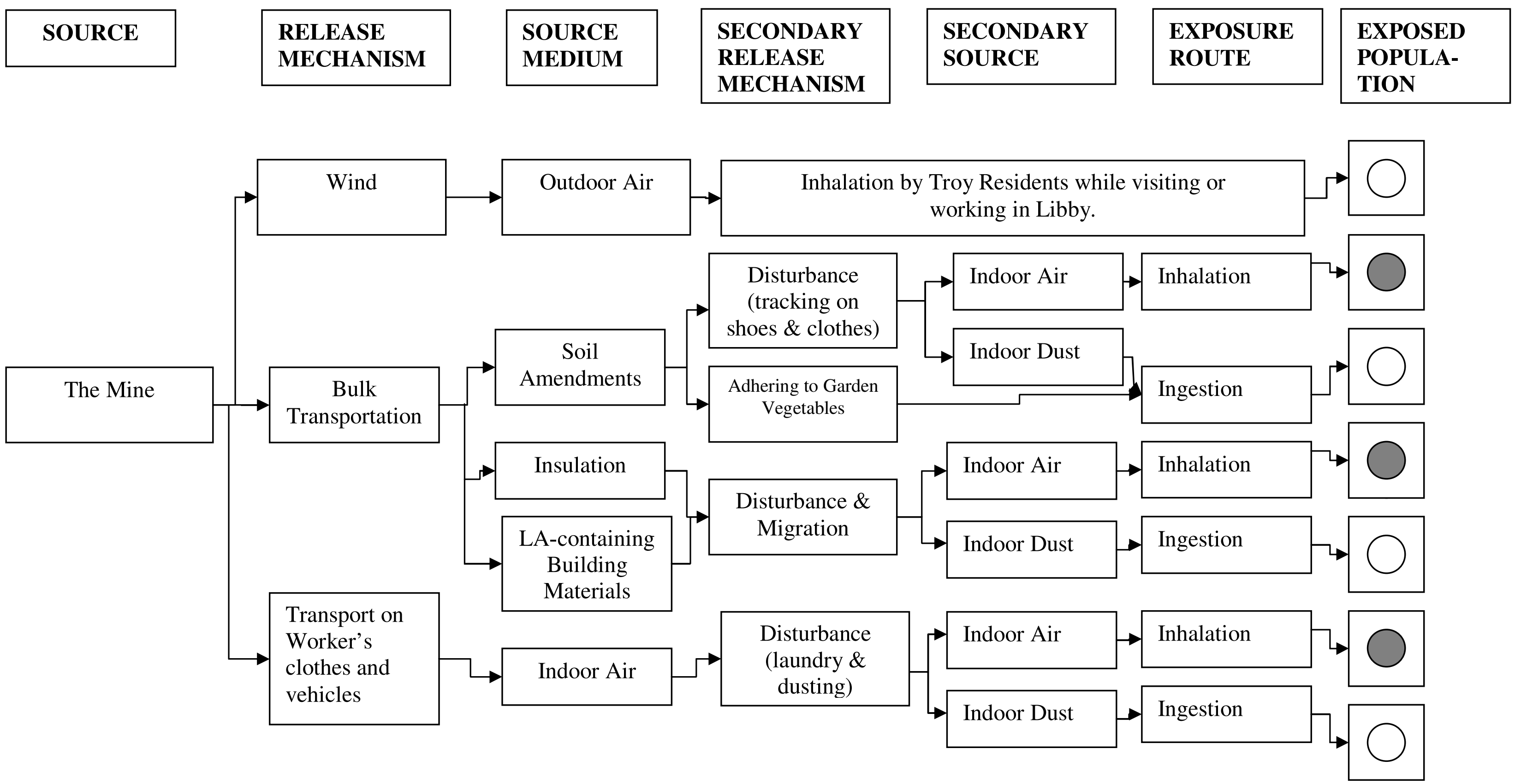
Comment [CDL5]: Or some text like this is necessary to clearly state we are not investigating all on the CSM.

Deleted: EPA, CDM, and the Montana Department of Public Health and Human Services (Montana DPHHS) have provided additional related background ... [4]



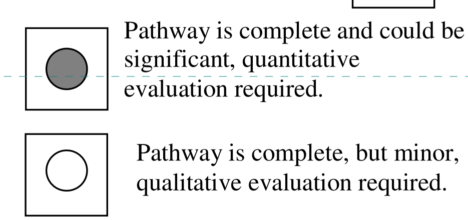


Figure 1-1: Conceptual site model – Potential Human Exposure Pathways to Asbestos at the Troy Operable Unit, Libby MT Superfund Site

Deleted: Site Conceptual Model

Figure 1-2: Topographic View of the Troy OU7

Comment [CDL6]: Can we use a really good aerial photo with the boundaries now instead of a topo? What do you think is better for the public?

1.4 SCHEDULE

Comment [CDL7]: Please update the schedule to reflect the potential for two sampling seasons, etc.

The schedule for the TAPE inspection and sampling field work is pending DEQ receiving adequate EPA funding. The TAPE field work may begin in the summer 2006 and would require approximately 75 full work-days to complete (15 weeks) based on an average of 15 total TAPE inspections per full day. The soil and dust samples collected from the TAPE field work will be prepared for analysis by CDM and analyzed for asbestos concentrations by a contract laboratory. Analysis of the samples is also dependent upon adequate EPA funding. Tetra Tech will prepare a TAPE Field Summary Report approximately 90 days after the completion of the field work. The draft TAPE project report would be submitted to the DEQ and others approximately 60 days after receiving the analytical data.

1.5 WORK PLAN ORGANIZATION

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This TAPE Work Plan is organized into eight sections. Section 1.0 is this introduction. The contents of Sections 2.0 through 8.0 are briefly described below.

- Section 2.0 Project Organization. This section identifies key project personnel and project responsibilities and provides an organizational chart and a table of participants with contact information.
- Section 3.0 Work Plan Rationale. This section describes the data quality objective (DQO) steps used to establish the quantity and the quality of data to support decision making.

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- Section 4.0 Field Procedures. This section describes the activities that will take place during the property evaluations. The SOPs for each activity and the HASP are referenced and detailed.
- Section 5.0 Field Quality Control Procedures: This section discusses the field quality assurance and quality control (QA/QC) procedures, including equipment decontamination, QC samples, field documentation, and chain of custody. Also discussed in this section are QA procedures used at the Libby Asbestos Superfund Site (EPA 2000c).

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- Section 6.0 Data Management. This section describes how the data will be handled after they have been received from the Libby V2 database.
- Section 7.0 QA/QC Procedures. This section will describe the procedures that will be taken to ensure the quality and integrity of the TAPE data.

Finally, references used in preparing this document are presented in Section 8.0.

2.0 PROJECT ORGANIZATION

Table 2-1 presents the responsibilities and contact information for key personnel involved in the TAPE inspection and sampling project. In some cases, more than one responsibility has been assigned to a person.

The John A. Volpe National Transportation Systems Center (Volpe Center) is providing support to EPA Region VIII, including management of the Libby V2 database which is used to store sampling, analytical, and other pertinent data from the Libby Asbestos Superfund Site. Tetra Tech will transfer Troy data to and obtain data from EPA and their contractors. Tetra Tech will transfer custody of all soil and dust samples to CDM after the samples have been recorded and organized. CDM will then be responsible for custody and quality assurance of the samples until delivery to a contract laboratory for analysis. CDM contracts all analytical laboratories used for the Libby Asbestos Superfund Site. Therefore, CDM will oversee laboratory schedules and track data deliverables.

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2.1 MONTANA DEQ OVERSIGHT

The DEQ Project Officer (or designee) will provide oversight of all field activities associated with this TAPE project. DEQ oversight personnel will have the ability to inspect all field and sampling activities, determine the appropriateness of the recorded data, and ensure that all activities comply with standard practices that meet the project objectives. Before any oversight is conducted, the Tetra Tech on-site health and safety coordinator will brief the DEQ oversight personnel to ensure safe practices are maintained throughout the TAPE field effort.

2.2 NON-AGENCY OBSERVATION OF FIELD ACTIVITIES

EPA will be allowed the opportunity to observe the TAPE project field activities. The request for non-Agency observation of field activities must first be coordinated with and approved by the DEQ Project Officer and property owner. When inspection and sampling are being conducted on a Troy property and the owners are present, the property owners will have the opportunity to (1) observe Tetra Tech field inspection and sampling, (2) obtain copies of the field forms and property sketches completed for the property, (3) obtain a receipt for samples collected, and (4) obtain a portion of samples collected (at the cost of the property owner). The Tetra Tech field team will brief property owners about the types of sampling and methods for completing the TAPE inspection and sampling; however, the Tetra Tech field team will not interpret results or make conclusions from the inspection and sampling for the property owner.

If Tetra Tech obtains soil or dust samples at a property, Tetra Tech will, if requested, provide the property owner with a receipt for the samples identifying the number and types of samples collected before the field crew leaves the property. No sample results will be available during the TAPE inspection and sampling. An individual property owner who requests a portion of a sample must supply all necessary materials required for sampling, as well as arrange and pay for laboratory analysis of all additional samples collected.

2.3 SPECIAL TRAINING AND CERTIFICATES

Tetra Tech personnel who work on the TAPE project will have met the Occupational Safety and Health Administration (OSHA) training requirements defined in Title 29 Code of Federal Regulations (29 CFR) Part 1910.120(e) for working on hazardous waste sites. These requirements include: (1) 40 hours of formal off-site instruction; (2) a minimum of 3 days of actual on-site field experience under the supervision of a trained and experienced field supervisor; and (3) 8 hours of annual refresher training. In addition, all Tetra Tech personnel working on the TAPE project will have taken the Asbestos Hazard Emergency Response Act (AHERA) 24-hour asbestos inspector training course and will hold a current asbestos inspector license issued by the State of Montana.

Tetra Tech personnel working on the TAPE project must read and abide by the stipulations and guidelines set forth in Tetra Tech's HASP, which is Appendix A to this TAPE Work Plan. The HASP provides written instructions for health and safety training requirements, personal protective equipment (PPE) requirements, spill containment program, and health-hazard monitoring procedures and techniques. At least one member of every Tetra Tech field team will maintain current certification in the American Red Cross "Multimedia First Aid" and "Cardiopulmonary Resuscitation (CPR) Modular" or equivalent.

Copies of Tetra Tech's health and safety training records, including course completion certifications for the initial and refresher health and safety training, specialized AHERA training, and first aid and CPR training, are maintained in the Helena Tetra Tech office files for all TAPE field team members.

TABLE 2-1

KEY PERSONNEL

Comment [CDL8]: Please include ESAT and EPA teams as they relate to sample prep. The CDM sample coordinator duties will need to be split between ESAT, EPA, and TtEMI now.

Name	Organization	Role	Responsibilities	Contact Information
Catherine LeCours	DEQ	Project Officer	• Monitors performance of the contractor • Reviews and approves QA measures • Consults with the EPA and Volpe • Reviews and approves all work plans (FSP/QAPP) • Provides coordination with EPA, Volpe, and CDM • Provides primary interface with the Troy community and disseminate project information to the public	Montana Department of Environmental Quality PO Box 200901 Helena, MT 59620-0901 clecours@mt.gov (406) 841-5040
J. Edward Surbrugg	Tetra Tech	TAPE Project Manager	• Responsible for implementing all activities called out in the task order • Supervises preparation of work plan and approves document • Monitors and directs field activities to ensure compliance with work plan requirements • Provides coordination with DEQ Project Officer • Disseminate project information to interested parties and Troy property owners and direct questions to DEQ	Tetra Tech, Helena, MT 7 West 6th Avenue Helena, MT 59601 edward.surbrugg@ttemi.com (406) 442-5588
Mark Stockwell	Tetra Tech	- TAPE Field Team Leader - TAPE QA/QC Manager	• Responsible for directing and coordinating day-to-day field activities conducted by Tetra Tech • Verifies that field sampling and measurement procedures follow work plan • Conducts field audits for QA/QC • Provides DEQ Project Officer and TAPE project manager with regular reports on status of field activities • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech, Sandpoint 7 West 6th Avenue Sandpoint, ID mark.stockwell@ttemi.com (208) 263-4524

TABLE 2-1
(Continued)

KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
	Tetra Tech	Troy Field Data Coordinator	• Responsible for working with TAPE project manager and TAPE field team leader to schedule TAPE inspections • Responsible for compiling, organizing, and auditing field data sheets and samples submitted daily by field teams • Responsible for transferring field data sheets and samples to the CDM Troy Sample Coordinator • Coordinate with CDM, EPA, and Volpe managers on sample delivery schedules and logistics • Reviews laboratory data before release to project team • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech, Helena, MT 7 West 6th Avenue Helena, MT 59601 jessica.allewalt@ttemi.com (406) 442-5588
	Tetra Tech	On-site TAPE Safety Officer	• Responsible for implementing health and safety plan and for determining appropriate site control measures and personal protection levels • Conducts safety briefings for Tetra Tech and site visitors • Can suspend operations that threaten health and safety • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech, Helena, MT 7 West 6th Avenue Helena, MT 59601 brett.veltri@ttemi.com (406) 442-5588
Ed Madej	Tetra Tech	Database and Geographic Information System Manager	• Responsible for developing, monitoring, and maintaining project database and property maps • Responds to requests from TAPE project manager and TAPE field team leader to provide copies of property maps to field teams on a daily basis • Works with CDM, Volpe, and EPA data and graphic managers to generate needed reports and maps from the Libby V2 database	Tetra Tech, Helena, MT 7 West 6th Avenue Helena, MT 59601 ed.madej@ttemi.com (406) 442-5588

Deleted: Jessica¶ Allewalt

Deleted: Joe Faubion

TABLE 2-1
(Continued)

KEY PERSONNEL

Name	Organization	Role	Responsibilities	Contact Information
10 members	Tetra Tech	Field Team Member	• Responsible for conducting TAPE inspections and sampling as described in the work plan and for following SOPs. • Disseminate project information to interested parties and Troy property owners and direct questions to TAPE project manager or DEQ	Tetra Tech, Helena, MT 7 West 6th Avenue Helena, MT 59601 (406) 442-5588
			•	
			•	
			▪	

Deleted: TBD

Deleted: CDM Troy Sample Coordinator

Deleted: Troy Sample Coordinator from CDM

Deleted: <#>Accepts FSDSs and corresponding samples from Tetra Tech ¶
<#>Responsible for quality review of electronic data entered by Tetra Tech ¶
<#>Coordinates with the CDM laboratory coordinator regarding laboratory or archive storage assignments ¶
<#>Prepares chain-of-custody forms (COCs); ships or hand delivers samples as necessary ¶
<#>Coordinates with the Tetra Tech Field Data Coordinator regarding laboratory sample/data issues; assists in the revision of FSDSs, electronic data, and COCs as necessary ¶
<#>Exports electronic data to the Volpe data manager (for upload into the Libby V2 database) and resolves any export file issues ¶
Provides general quality control input for consistency with Libby project sample and data collection requirements

Deleted: Troy Field Office¶
TBD

Deleted: Courtney Zamora

Deleted: Volpe Center, US DOT

Deleted: Libby Site Manager/Field Representative

Deleted: <#>Field Representative for Volpe Center¶
<#>Review documents from Troy for consistency with Libby¶
Respond to resident's request ... [5]

Deleted: EPA Information Center¶
501 Mineral Ave¶
Libby MT 59923¶ ... [6]

Deleted: Shawn Oliveria

Deleted: CDM Libby

Deleted: Libby Site H&S Manager

Deleted: <#>H&S Manager for Libby Asbestos Project since 2002. ¶
<#>Implement the Project Ai ... [7]

Deleted: CDM Libby Office¶
(406) 293-8595 (office)¶
(406) 293-1547 (cell)

TABLE 2-1
(Continued)

KEY PERSONNEL

Roger Hoogerheide	EPA	Remedial Project Manager	•	

Deleted: Mike Cirian

Deleted: <#>On-Site Remedial Project Manager for the Libby Asbestos Superfund Site¶ <#>Manage construction activities¶ Resolve conflict and respond to residential inquiries in Libby

Deleted: EPA Information Center¶ 501 Mineral Ave¶ Libby MT 59923¶ (406) 293-6194¶ Cirian.mike@epa.gov

Deleted: /Environmental Engineer

Notes:

CDM	Camp Dresser & McKee	DEQ	Montana Dept. of Environmental Quality
EPA	U.S. Environmental Protection Agency	FSP	Field Sampling Plan
QAPP	Quality Assurance Project Plan	SOP	Standard Operating Procedure
TAPE	Troy Asbestos Property Evaluations	TBD	To be determined
Volpe	John A. Volpe National Transportation Systems Center	Tetra Tech	Tetra Tech EM Inc.
QA/QC	Quality Assurance/Quality Control		

Before work begins at a specific project site, Tetra Tech personnel are required to undergo site-specific training that thoroughly covers the following areas:

Comment [CDL9]: Maybe move this bullet list before the table as it ties closer to the discussion of training.

- Names of personnel and alternates responsible for health and safety at a project site
- Health and safety hazards present on site, including heat, physical stressors, insects and other potential biological hazards
- Selection of the appropriate personal protection levels
- Correct use of PPE
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazardous substances, physical stressors (heat, cold), and other potential hazards
- Contents of the HASP

Comment [CDL10]: Expand this list to include community relations, using PDA's, LA-specific morphology and health related issues, etc.

3.0 TROY DATA QUALITY OBJECTIVES

This section presents the DQOs for the TAPE inspection and sampling project. The DQOs are qualitative and quantitative statements developed through the seven-step DQO process (EPA 2000a, 2000b). The DQOs help to clarify the study objectives, define the most appropriate data to collect and the conditions under which to collect the data, and specify tolerable limits on decision errors that will be used as the basis for establishing the quantity and quality of data needed to support decision-making. The DQOs are used to develop a scientific and resource-effective design for data collection. The seven steps of the DQO process for this TAPE project are presented in Table 3-1.

Background information for the Troy OU7 study area was discussed in Section 1.0 as was a draft Conceptual Site Model (Figure 1-1). Because vermiculite, stoner rock, and other LA-contaminated wastes were transported from the mine to Troy properties at irregular and unpredictable intervals, sources of LA contamination may be found are not predictable; DEQ has therefore determined that each property in the Troy OU7 (including privately-owned and publicly-owned property) will be investigated and screened. The properties may or may not contain a building, or multiple buildings; and specific use areas, common use areas, limited use areas, and non-use areas, grouped together as exterior use areas. Please see Section *** for definitions and classifications of each exterior use area.

The DQOs will be used to design the TAPE project so that the sampling and analysis are appropriate to provide information to EPA regarding the properties with vermiculite-containing insulation (VCI) and other potential sources of LA contamination (vermiculite, building materials, or soil) within the Troy OU7.

Comment [CDL11]: Again remind the readers we are not looking at every pathway or clearly refer back to a figure of pathways just for this work plan. For some reason, transportation corridors keep coming up in EPA comments – we are NOT doing those under this workplan. We'll need a totally different approach for the ROW on the highway and the railroad.

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Deleted: The Troy properties, where sources of LA contamination may be found, are not predictable

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Comment [CDL12]: Feel free to fix this sentence as needed.

Deleted: (gardens, former gardens, flower beds, gravel and dirt driveways, and play areas; all are areas with potentially greater exposure or greater use of vermiculite amendments); and yards and open space

Comment [CDL13]: Please revise the text to define exterior use areas as defined in the Visible Vermiculite SOP. Please include definitions and examples for each exterior use area in a later section. I provided a suggestion as to where.

TABLE 3-1

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY OPERABLE UNIT

STEP 1: State the Problem
Section 1.0 of this Work Plan summarizes the history of the Libby Asbestos Superfund Site, identifies the key players and decision makers, illustrates the Conceptual Site Model, provides justification for the investigation and screening for the Troy OU7, and identifies the schedule, budget, and necessary resources. **The following are problem statements associated with the Troy Properties investigation:** • Exposure to LA-contaminated vermiculite or waste product is a threat to human health (EPA 2000c). • Respirable LA asbestos is released when source materials are disturbed (EPA 2000c). • Potential source materials include VCI, LA-containing building materials, vermiculite waste products, soils contaminated with LA, and household dust. • All contaminated source materials (e.g., household dust, contaminated soils, etc.) can potentially contribute to exposure pathways. • LA-contaminated materials may be found randomly within the Troy OU7. • All properties within the Troy OU7 should be evaluated for sources of LA contamination.
STEP 2: Identify the Decisions
Principle Discussion Question: Do sources of LA contamination exist at properties within the Troy OU7? **Property Identification Decisions:** • Identify the potential properties to investigate. • Identify the number of buildings on each property. • Identify the number and type of exterior use areas on each property in the Troy OU7. **Sampling Decisions:** Inspect properties within the Troy OU7 to visually and/or analytically confirm the presence or absence of LA contamination in attics, other interior building spaces, and exterior areas, and the concentrations of LA if present. • Visual inspection and identification of LA in exterior and interior areas will be conducted pursuant to this Work Plan. • Where will interior dust samples be collected? • Where will building material samples be collected? • Where will exterior soil samples be collected?

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Deleted: Household dust and indoor air are

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Deleted: specific use areas, yards, and open space areas

Comment [CDL14]: Not Questions – the bullets below should be phrased as defining statements.

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TABLE 3-1 (continued)

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY OPERABLE UNIT

STEP 3: Identify Inputs to the Decisions
For each property, inputs to the decision include: • Review of aerial photographs to define individual properties, compile addresses, and determine if the property could be individually bought or sold. • Visual inspections of property to determine location and number of buildings, exterior use areas, living spaces, and attics. • Documented visible VCI in attics. • Documented visible VCI and other LA-containing building materials in interior building spaces (including but not limited to walls, crawl spaces, etc.). • Documented visible vermiculite in exterior use areas. • Interviews with residents, owners, occupants, and employees • Visual inspection and analytical results from samples collected at each property.
STEP 4: Define Study Boundaries
• The Troy OU7 generally consists of the valley bottom from the north half of Section 25, Township 31 North, Range 34 West, and Section 30, Township 31 North, Range 33 West, east to the junction of Highways 56 and 2, and north to the northern edge of Section 21, Township 32 North, Range 34 West. Figure 1-2 shows the configuration of the study area for the Troy OU7. • Some properties (approximately 25) within the Troy OU7 have previously been inspected and sampled under the Libby OU4 investigation. Data have been recorded in the Libby database for these properties and will be integrated with additional sampling data from the TAPE. •

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Deleted: special use areas, yards, or open space areas

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Comment [CDL15]: Please include a brief temporal study boundary discussion regarding the time-frame for the investigation.

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TABLE 3-1 (continued)

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY PROPERTIES

STEP 5: Develop Decision Rules
The Record of Decision for the Troy OU7 will identify the specific parameters, conditions, and concentrations of LA that determine if a source exists at an individual property and if that source requires cleanup. This Work Plan simply details how DEQ will collect sufficient and defensible information essential to support future cleanup decisions. That information includes conversations with property owners and other anecdotal information regarding historical use of vermiculite, VCI, and other LA containing materials, visual inspections, and sample results. Sampling decisions for the Troy OU7 are based on sampling protocols and limited sampling results from the work done in Libby. Cleanup decisions will be based on the presence of and the concentrations of LA contaminated materials • Visually determine if VCI is present or absent in attics of all buildings. • If VCI is visible in a building attic, then collect dust samples from the living spaces to evaluate the presence and concentrations of LA. • If VCI is not visible in an attic, then collect dust samples from the living spaces to evaluate the presence and concentrations of LA from any secondary indoor source of LA. • If vermiculite is visible in the living space of a building interior, then collect discrete samples to evaluate the presence and concentrations of LA in the area. In addition, collect dust samples from the other building levels or areas to evaluate the presence and concentrations of LA in those living spaces. • If vermiculite is not visible in a building interior, then collect dust samples from the living spaces to evaluate the presence and concentrations of LA from any secondary indoor source of LA. • Visually determine if vermiculite or LA is present in exterior use areas. • Collect discrete soil samples from specific use areas to evaluate the presence and concentrations of LA. • If the property contains a yard and large open space, then subdivide these areas by common use, limited use, or non-use areas and collect a composite soil sample from each exterior use area to evaluate the presence and concentrations of LA. Figure 3-1 shows the steps used to inspect and sample buildings and exterior property in the Troy OU7. Figure 3-2 provides some typical outdoor soil sampling designs for exterior use areas.

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Deleted: <#>If vermiculite was used in building materials (plaster, concrete, or chinking), then collect building material samples to evaluate the presence and concentrations of LA from this potential secondary indoor source of LA.¶

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Deleted: similar land uses (for example, grassed areas, driveways, parking areas, and front, back, and side yards)

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TABLE 3-1 (continued)

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY PROPERTIES

STEP 6: Specify Tolerable Limits on Decision Errors

- Sampling and measurement error are associated with environmental data collection and may lead to decision errors. Sampling error occurs when the sample is not representative of the true site conditions. Measurement error occurs because of random and systematic errors associated with sample collection, handling, preparation, analysis, data reduction, and data handling. Decision errors are controlled by adopting a scientific approach that uses hypothesis testing to minimize the potential for error.
- There are two types of decision error: false negative error, and false positive error. A false negative decision error occurs when the null hypothesis is rejected although it is true. The consequences of a false negative error would be that VCI or LA-contaminated dust or soil at a Troy property is not identified for further evaluation and possible remediation. A false positive decision error occurs when the null hypothesis is not rejected although it is false. The consequences of a false positive error are that unnecessary resources are expended to evaluate media that is not truly contaminated or does not pose a concern.
- Property-specific sampling objectives and the random distribution of vermiculite and LA-contaminant soil limit the usefulness of statistical methods to eliminate sampling error. Tolerable limits on sampling decision errors cannot be precisely defined; however, the decision errors will be minimized by inspecting and screening all properties in the Troy operable unit. Future decision errors based on analytical data will be minimized by the use of standard EPA-approved and Libby-specific analytical methods and other pertinent information available from the Libby Asbestos Superfund Site.

STEP 7: Optimize the Sampling Design

- All properties in the Troy OU7 will be uniquely defined in the work plan, and their locations will be identified using existing Lincoln County records, cadastral databases, and low-level aerial photographs. The number of Troy properties to be investigated will be approximately 1,000. Some houses and buildings likely are on multiple platted properties.
- Dust and soil samples will be collected using similar methods and standardized procedures that have been employed for the Libby OU4, updated when necessary based on current state of knowledge. With more than 4,000 Libby properties sampled since 2001, the methods have been defined (CDM 2002; CDM 2003a; CDM 2003b; EPA 2003a).
- Field QA/QC procedures will be implemented and will include equipment and personnel decontamination, QC samples, field documentation, and sample chain of custody. Scientifically valid and legally defensible data will be supported by collection of dust and soil field blanks and other QC samples at a frequency necessary to assess potential cross contamination from equipment and sample integrity during collection.
- Field sample data sheets, similar to those used in Libby, will be completed for each sample collected and each property inspected within the Troy OU7. The field data sheet information will be recorded into the electronic Libby Asbestos Sample Tracking Information Center (eLASTIC) application for uploading to the existing Libby V2 database.

Deleted: remediated

Deleted: undertake remedial action to address contaminated media that do not exist at concentrations that exceed action levels or acceptable risk levels

Comment [CDL16]: The TAU was confused by what was meant here. Please try another way to explain this first sentence.

Comment [CDL17]: Per Wendy O'Brien, she disagrees. Sampling error can be minimized with an appropriately designed sampling plan. For example, a good sampling plan can minimize error associated with decision unit heterogeneity.

Deleted: Therefore, sampling methods and procedures will be based on results from the Libby Asbestos Superfund Site.

Comment [CDL18]: Per Wendy O'Brien, please define sampling decision errors. Do you mean sampling error or decision error?

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Comment [CDL19]: Please revise as necessary to reflect the recent Sample/Data Management changes. (elastic, CDM, etc.)

Comment [CDL20]: Can you please insert the exact number?

Comment [CDL21]: Please include a bullet to reflect the interview and other non-sample information to be collected.

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Comment [CDL22]: Please add the Visible Vermiculite SOP.

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TABLE 3-1 (continued)

DATA QUALITY OBJECTIVES
INVESTIGATION OF TROY PROPERTIES

STEP 7: Optimize the Sampling Design (Continued)
• Dust and soil samples collected at each Troy property will be uniquely labeled, and sampling information will be recorded into the eLastic application. The paper sample records, along with the samples, will be transferred under chain-of-custody procedures to a CDM sample data coordinator, who will verify completeness and accuracy of the records. • Montana DEQ and its contractor, Tetra Tech, will work closely with EPA, Volpe, and its contractor, CDM, to ensure that sample integrity is maintained throughout and that data quality is adequate to meet project objectives. • CDM will transfer the electronic sampling and field form information to EPA and Volpe and prepare the samples for analysis. • Figure 3-3 provides a schematic diagram of the TAPE process used by Tetra Tech to organize, conduct the property evaluations and sampling, and provide samples and electronic information to CDM, EPA, and Volpe.

Comment [CDL23]: Obviously in need of revision.

Figure 3-1 TAPE Inputs

Figure 3-2 TAPE Outdoor Soil Sampling Design

Figure 3-3 TAPE Inspection and Sampling Process Diagram

4.0 FIELD PROCEDURES

Comment [CDL24]: I'll leave it up to you as to how much you want to add details about the PDA's and pre-population of access agreements, mailing list, etc. You don't need to add anything if you don't want to – it won't impact the document.

This section of the TAPE Work Plan describes the field activities to be implemented for the TAPE inspection and sampling project and includes the following tasks:

- Mobilizing and demobilizing
- Obtaining access agreements
- Scheduling inspections with property owners
- Conducting verbal interviews
- Conducting property inspections – indoor, attic, outbuildings, exterior use areas (using the inspection field form [IFF])
- Collecting indoor dust samples (recorded on dust sample field sampling data sheet [FSDS])
- Collecting outdoor soil samples (recorded on soil sample FSDS)
- Collecting QA/QC samples
- Decontaminating equipment and personnel
- Containing and disposing of investigation-derived waste

Deleted: outdoor open spaces, yards, specific

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SOPs, with current amendments, are provided in Appendix B and are referenced throughout this section of the TAPE Work Plan. As appropriate, Tetra Tech has developed project-specific guidance for Troy which is based largely on guidance developed specifically for the Libby Asbestos Superfund Site. The Tetra Tech project-specific guidance and the Libby-specific guidance documents that were used to generate the Troy guidance are listed below and copies are provided in Appendix B.

- Tetra Tech — TAPE FSDS and IFF Completion Guidance, Version 01
- Tetra Tech — TAPE Soil Sampling Guidance, Version 01
- CDM-Libby-03 — Libby guidance for completing the FSDSs
- CDM-Libby-04 — Completion of Information Field Form
- CDM-Libby-05 — Site Specific Standard Operating Procedure for Soil Sample Collection

Comment [CDL25]: Obviously need revision based on Scribe and PDA's.

Health and safety protocols and requirements will apply to all field activities and are summarized below. Information on quality control is provided in Sections 5.0 and 7.0 of this TAPE Work Plan.

4.1 HEALTH AND SAFETY PROCEDURES

The TAPE HASP (Appendix A) and Tetra Tech's corporate health and safety program plan will apply to all field activities undertaken as part of this project. All field staff conducting inspection and sampling activities will be required to:

1. Hold a current OSHA hazardous waste operations (HAZWOPER) 40-hour training certification and up-to-date 8-hour refreshers, as required under 29CFR1910.120;
2. Hold a current asbestos inspector training certificate;
3. Hold a State of Montana asbestos inspector license;
4. Have medical clearance to work wearing a half-face air purifying respirator; and
5. Be quantitatively fit-tested for the specific project respirator within the 12 months prior to the field activities.

The TAPE HASP in Appendix A provides detailed health and safety protocols and requirements, including directions for when to use PPE, such as respirators. All attic entries will be conducted in modified level C PPE that will include a half-face or full-face air purifying respirator with HEPA cartridges. Other property inspection activities, including dust sampling and soil sampling, will be conducted in modified level D PPE. Mr. Joe Faubion will be the Tetra Tech Site Safety Officer for the field activities (see Table 2-1 of this TAPE Work Plan). Negative exposure assessments for the field teams will be performed as necessary, as described in the HASP and at the direction of the Site Safety Officer.

Comment [CDL26]: Who now?

Comment [CDL27]: Please expand to include a brief discussion here of personal and stationary samples. Including FSDS forms, EMSL lab in Libby, etc. Of course, update the HASP also with more detail.

4.2 SITE ACCESS AND LOGISTICS

Section 4.2 provides information about community relations, logistics and schedules, and site access agreements.

4.2.1 Community Relations and Information Centers

Tetra Tech will coordinate with DEQ to ensure that sufficient public outreach (including public meetings, fact sheets, newspaper articles and notices, and radio announcements) is completed before and during implementation of the TAPE. Tetra Tech will provide personnel to attend public meetings in Troy and will help prepare presentation materials, at DEQ's request. Public outreach and information on the purpose and nature of the TAPE and its role in the overall investigations and cleanup at Troy and Libby are essential to its success.

Tetra Tech and DEQ will provide a public information center and field offices for the sampling teams located at 303 North 3rd. The office is centrally located across from the Troy Senior Center, next door to the public library and on the same street at the Troy City Hall. The Tetra Tech field office will be the TAPE logistical center for obtaining property access agreements, scheduling field activities, returning samples and field forms at the end of the day, and transferring sample custody from Tetra Tech to the ESAT sample preparation laboratory. The Tetra Tech field office will also provide a physical location and venue for people in Troy to provide and obtain information about the project. The Tetra Tech field office will also have telephones and answering machines for contacting project personnel when the office is not staffed and after regular hours (Monday through Friday 8:00 am to 5:00 pm). The address and phone number for the Tetra Tech field office will be advertised and posted at the location.

Deleted: will set up and staff a field office in Troy at least 1 month before and for the duration of TAPE field activities

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Comment [CDL28]: Make sure we include the phone number if at all possible before "print" date of the TAPE.

The existing EPA Information Center at 501 Mineral Ave in Libby will also be an information resource for Troy residents, providing access to major project documents. Troy area residents may phone the information center toll free at 1-888-420-6810 or visit the center Monday through Friday from 8:30 a.m. to 5:00 p.m.

DEQ has established a repository for general and Troy-specific information at the City Hall in Troy, located at 301 E. Kootenai. The Troy City Hall is open Monday through Friday from 8:00 a.m. to 5:00 p.m. Tetra Tech and DEQ will continue to provide updated information in City Hall throughout the field sampling activities.

Information about the Libby Asbestos Superfund Site is also available on the Internet at <http://www.epa.gov/region8/superfund/libby.html>. DEQ will maintain updated information regarding Troy on this webpage.

Section 2.0 of this Work Plan discusses the roles and responsibilities of the DEQ and Tetra Tech in community relations.

4.2.2 Logistics and Schedule

Tetra Tech will establish a field office in Troy for the duration of TAPE field activities. Tetra Tech and DEQ will identify and provide all necessary personnel, sampling equipment, PPE, and project materials for implementing this Work Plan. All Tetra Tech field personnel will be trained not only in specific tasks but also on the overall objectives of the TAPE. This training will facilitate TAPE implementation and allow for effective communication with the public and other team members.

Tetra Tech personnel will include the TAPE project manager, who will oversee all project activities and logistics and will ensure that the lines of communication are maintained to resolve any issues or concerns that may arise during the field efforts. The Tetra Tech project manager will reside in Helena but will be at the project site in Troy for about 50 percent of the field activities. The TAPE field team leader will be based out of Troy and will be responsible for obtaining site access agreements, assisting with public outreach, scheduling daily field activities, and providing quality control and oversight of the five TAPE field teams. Tetra Tech will also provide a field data coordinator to reside in Troy and assist the project manager and field team leader with daily project tasks. The Tetra Tech Field Data Coordinator will have primary responsibility for checking and cataloging soil and dust samples at the end of each day and for working closely with the ESAT Troy Sample Coordinator to ensure that complete, adequate, and secure sample information is collected and transferred to EPA. The detailed responsibilities for these Tetra Tech project personnel are further discussed in Section 5.5.

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Tetra Tech will provide five two-person TAPE field teams stationed in Troy for the duration of the field effort. Some substitution and rotation of field staff on and off the TAPE project is expected, but the field staff will work a minimum of 2 weeks before substitutions occur. The Tetra Tech field team leader (Mr. Stockwell) will continuously accompany the field teams to ensure and verify that the teams are conducting the TAPE activities as described and outlined in this Work Plan. The Tetra Tech field teams may conduct limited TAPE inspections on weekends (both Saturday and Sunday) to better accommodate the schedules of Troy property owners. Both members of a field team will be HAZWOPER certified, hold current asbestos inspector licenses, and be trained to properly handle the health and safety protocols for this project.

Comment [CDL29]: Add a sentence about the site-specific training and that it is expected that all field team members will attend.

On average, a Tetra Tech field team will complete two to three TAPE inspections per day, depending on the complexity of the properties inspected. With five field teams, Tetra Tech can complete an average of 11 total TAPE inspections per full day. If the field inspections continue uninterrupted, Tetra Tech could complete the inspections of 1,000 Troy properties in about 100 (or whatever the math shows) full work

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Comment [CDL30]: Specific number as before please.

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days, or within a 20 week time frame. Tetra Tech's projected schedule for completing the TAPE inspections will be finalized when DEQ receives adequate EPA funding.

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4.2.2.1 Communications

Field team members will be provided with cell phones (which will necessitate use of a temporary cell tower), satellite phones, or multi-way radios for the duration of field activities. Contact information, including emergency numbers, for all field teams and for TAPE project management personnel in Helena, Montana, will be stored in the Tetra Tech Troy field office. In addition, the Montana DEQ TAPE Project Officer (Ms. Catherine LeCours), ESAT Troy Sample Coordinator, and EPA Libby Asbestos Superfund Site personnel will be provided with contact information for ready access to the Tetra Tech field teams.

Comment [CDL31]: Can we firm this up yet?

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4.2.2.2 Equipment

Appendix C details equipment and supplies Tetra Tech identified as necessary for the TAPE field activities described in this Work Plan. Equipment and supplies that are not immediately available to Tetra Tech or DEQ will be purchased or rented before TAPE field activities begin. Before purchased or rental equipment or supplies will be accepted, the Tetra Tech field team manager will inspect the goods to ensure they are in good condition and free of defects.

4.2.2.3 Pre-Field Activities

Comment [CDL32]: Can we also talk about the PDA pre-population of fields?

Before field crews mobilize to Troy for the TAPE field inspections, Tetra Tech will prepare detailed property maps that identify individual Troy properties. Property boundary and other details will be gathered from public databases (cadastral) and projected onto a high-quality, high-resolution air photograph. Individual Troy property maps will be used during the TAPE field inspections to record approximate locations of the specific use areas and yard samples collected at each property. These property maps will be field checked and may be revised as necessary during the inspections. Tentative inspection and sampling schedules may be based on a block-by-block TAPE inspection pattern. The TAPE inspection schedule will be refined as Tetra Tech schedules the inspections at times and dates convenient to the property owners.

Comment [CDL33]: Revise this to indicate the photos are useful for reference but sketches will be prepared in the field.

4.2.2.4 Field Team Organization

Five field teams of two people per team will conduct the TAPE inspections and sampling. On average, 1 properties will be inspected and sampled per day. At the start of each day, the field teams will meet at the Tetra Tech field office for daily safety and organizational briefings (see Section 4.1 and Appendix A HASP).

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Before the morning briefing, the Tetra Tech field team leader will have prepared PDA and packet? for each field team to include specific information for each property to be inspected and sampled that day. Each PDA and packet will include:

Comment [CDL34]: Update based on PDA's – instead of packet – just use PDA?

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- Confirmation that the office has a signed access agreement or blank access agreement if occupant provided prior verbal agreement,
- Details of the scheduled inspection date and time, and the name and telephone number of the property owner or the person who will be present for inspection and sampling, if different than the property owner,
- A property-specific verbal interview form,
- A property-specific IFF,
- A property-specific FSDS,
- Preprinted property-specific property, building, sample point, and sample identification labels, and
- Two copies of the property parcel maps.

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Comment [CDL35]: Not any more?

Each field team will have a numbered logbook specific for the Troy project and will be responsible for any additional information included in the logbook. Additional TAPE inspection and sampling supplies (as described in Appendix C, list of supplies) will be kept at the Tetra Tech field office for use by the field teams. The daily briefings will be used to coordinate daily property inspections, calibrate sampling equipment, and collect supplies. The daily briefing will include a review of any issues or problems that arose the previous day, and will provide an opportunity for field team members to ask questions and share lessons learned. At the end of each day, field teams will return to the field office to deliver samples and paperwork to the Tetra Tech Field Data Coordinator, download digital cameras, charge rechargeable equipment, and store field equipment for the evening. Section 6.0 of this Work Plan contains additional logistical details on TAPE data management.

4.2.3 Access Agreements

Approximately 1 month before TAPE field activities begin, Tetra Tech will assist DEQ with mailing access agreements to every Troy property owner where the property has been identified for inspection and sampling. A cover letter will contain information from DEQ on the proposed sampling and contact information for Tetra Tech Troy field office, DEQ, EPA, and the Libby Information Center. The packet will also contain two copies of an access agreement form and a postage-paid envelope for the property owners to return a completed access agreement. The other copy of the access agreement is for the property owner's records. The cover letter will explain the need for the signed access agreement and encourage any property owners who have questions or concerns about the process to contact the designated parties. An example cover letter and access agreement is provided in Appendix D.

Comment [CDL36]: Please include a short discussion that the access agreements will be scanned and become a part of the electronic record for the property. A separate agreement will be completed for each parcel.

The Tetra Tech project manager and field team leader will manage information mailed in from the Troy property owners, including signed access agreements. Approximately one month after DEQ and Tetra Tech mail the access agreements, a field team of two Tetra Tech personnel will follow up with properties where no response has been received. Follow up contacts (in person or by telephone) will explain the purpose of the TAPE, describe the inspection and sampling process, and answer any pertinent questions. Property owners may provide verbal approval and schedule an inspection; therefore, field teams may obtain a signed access agreement immediately prior to a scheduled inspection.

If property owners are not available during the reconnaissance, the field team will revisit each location at least three times, and the field team leader (or designee) will continue to follow up with personal visits and by telephone. After repeated attempts to contact the property owner by the field teams and the field team leader, Tetra Tech will repeat the mailing with a letter describing the attempts made to contact the property owner.

When the field team leader has received either verbal approval or a completed and signed access agreement either by mail or from a field team, Tetra Tech will contact the property owner by telephone to schedule a TAPE inspection and sampling visit.

Tetra Tech will make reasonable efforts to find a TAPE inspection and sampling date and time that are convenient for the property owner. TAPE inspections and sampling schedules will include evenings (daylight hours only) and weekends, as needed based on the requests of property owners. If property owners respond to the access agreement favorably, but a property is currently uninhabited (for example, it is only seasonally occupied or is currently for sale, or no buildings are present on the property), Tetra Tech will attempt to inspect and sample the property with a designee of the property owner. Properties will not be exempted from inspection or sampling on the basis that they are currently uninhabited, however.

Tetra Tech will not advise property owners of the likely nature of removals at their properties or estimated removal dates during the TAPE scheduling phase, the personal interviews, or the TAPE inspections and sampling. Property owners will be advised that DEQ and EPA will determine removals and schedules after analytical results have been received and evaluated.

Some Troy property owners may be non-responsive or unwilling to sign an access agreement, even when Tetra Tech has attempted to contact them by all reasonable means (telephone, visit to the property, and repeated mailings) to obtain permission for a TAPE inspection and sampling. Tetra Tech will provide DEQ with a list of all Troy properties where the property owner could not be contacted or refused to sign an access agreement at the conclusion of TAPE field activities.

4.3 VERBAL INTERVIEW

The Troy property visit by the TAPE field team will commence with a verbal interview by the field team with the property owner to acquire background information about the property. The field team will interview the property owner using the questions provided on the interview form (Appendix E). Interview topics will include the known or suspected use of VCI or other LA-containing building materials in the house or outbuildings and possible introduction of other sources of LA within or near the property (including garden and landscaped areas and neighboring properties). A unique property identification number (AD-XXXXXX) will be assigned to each individual property that is inspected.

Comment [CDL37]: Apparently the April version has a title for this form – obviously those will all need to be changed throughout and referenced with the PDA?

Comment [CDL38]: Please indicate the AD#'s for Troy OU7 will begin with 100001 and then go up from there as not to conflict with Libby OU4.

All buildings encountered during the TAPE inspections will be classified as either a primary structure (habitable building, for example, a house, apartment, or main commercial space); or a secondary structure (non-habitable building, such as garages, shops, sheds, barns, or dog houses). The verbal interview will address all primary and secondary buildings and exterior use areas located on a Troy property.

Deleted: special use, open space, and yard areas

4.4 BUILDING INSPECTION, SAMPLE COLLECTION, AND RECORDING PROCEDURES

This section describes the inspection, sampling, and recording to be completed for each TAPE inspection.

4.4.1 Indoor Inspection

Comment [CDL39]: Please include a limited discussion regarding the potential for minor repairs to existing or new (be careful here – don't scare the residents that we are going to damage their homes) damage to reduce the exposure.

The two-person field team will visually inspect each building for the presence of LA contamination. One team member will access and inspect the attic (if safe, present, and reasonably accessible) and will inspect additional areas where VCI may be exposed in living spaces (crawlspaces, closets, and any wall openings). If VCI is observed, the field team member will estimate the quantity based on field measurements or visual estimation, with field measurements (length, width, and height of item) collected wherever possible.

The second team member will document results, including estimated quantities of VCI and other insulation (if present), on the IFF and will record additional pertinent information in the field logbook. As much as is possible in a non-destructive manner, the visual inspection will include checking under other types of insulation (such as blown-in or fiberglass insulation) for VCI. Visual inspections will not involve opening up walls or ductwork to inspect for VCI within the building wall cavities, but will include removal of a representative sample of electrical switch plates to inspect wall interiors. Furthermore, it will include inspecting ductwork in accessible, unfinished areas of the building for VCI. In particular, the field team will note whether utility conduits (including heat/cooling vents) run from the attic to the living space. Visual inspections will not include inspecting the roof.

Attics will be considered reasonably accessible if they can be reached by stairs, hanging stairs, or a non-conductive stepladder (either from the interior or exterior of the building). Attics will be inspected in a manner that, in the judgment of the field team, is not likely to release additional VCI into the living space (exterior access is preferable). The field team will compare exterior roof lines and interior ceiling heights with attic interiors in an effort to identify isolated attic areas that may exist between the roof and the main attic, or between the attic and the interior ceilings. If isolated attics are found, they will be inspected if possible, and barriers between attic areas and access points will be described in the IFF. Attic inspections will also involve inspection of kneewalls (areas where the pitch of the roofline meets the walls). Kneewalls may be used for storage or to improve the finished look of an attic. Kneewalls will be accessed wherever possible, as these areas may provide additional information on construction material. (For example, kneewalls may have unfinished floors compared with the finished floors in the rest of the attic.) If trusses or bracing posts are present in the attic that may pose an obstacle to potential cleanup, these items will be briefly described in the inspection form.

As detailed in the HASP, decontamination zones will be established during the TAPE project, such as at the base of ladders used to access attic spaces or outside of crawl space entrances. These areas will be covered with two layers of polyethylene sheeting during sampling in the attic or crawl space. After personal and equipment decontamination are complete and polyethylene sheeting removed, decontamination areas will be cleaned of debris and residue using appropriate HEPA vacuuming or wet cleaning procedures. Visitors, including building occupants, will not be permitted to enter the decontamination zone without proper qualifications and authorization.

If potted plants are located inside the primary building, the field teams will note whether vermiculite-containing potting soil is present, as this type of soil could affect results of dust sampling.

As described in the HASP (Appendix A), the field team will not be required to access any attics, crawl spaces, or living areas if there is an unacceptable safety hazard, including biological hazards. The field team will not inspect Troy properties for non-VCI and non-LA asbestos. However, damaged or friable suspect asbestos-containing materials that are observed in the inspection will be noted in the field notebook. This information may be of use in interpreting sampling results and planning potential remediation efforts.

The field team may choose to photo-document specific conditions in the building during the TAPE inspection for future reference. The property owner will be asked for permission before any photographs are taken.

TAPE inspections will be documented on IFFs (Appendix E) and in the field logbooks. Pertinent details will include, but are not limited to, identifying the primary and secondary buildings, defining attic spaces, and detailed property sketches.

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As described in Section 4.3, buildings on a property will be classified as primary or secondary. Every primary and secondary building will be subject to a TAPE inspection, an IFF will be completed, and samples collected.

4.4.1.1 Record Building Locations with GPS

As part of the TAPE inspection, the location of each primary and secondary building on the property will be recorded using the backpack-mounted Trimble XRS-Pro global positioning system (GPS). The GPS

Comment [CDL40]: Update for PDA units.

location will be recorded at the primary entrance to each building. Coordinates will be saved on the GPS with a unique identification number that starts with the notation "BD-XXXXXX," where "BD" indicates a building location, and will also be recorded by the field team on the IFF and in the field logbook.

Comment [CDL41]: Please indicate the BD#'s for Troy OU7 will begin with 100001 and then go up from there as not to conflict with Libby OU4.

4.4.2 Indoor Dust Sampling

Comment [CDL42]: Please revise text to reflect a 20-30 aliquot sample of dust, one sample from each level – no longer high traffic and low traffic areas.

Dust samples will be collected using microvacuum (microvac) sampling techniques in all primary buildings, regardless of whether VCI or other LA-containing building materials are observed. Asbestos is not visible to the unaided eye and not all sources (historical or current) may be identified during visual inspection, therefore, dust samples are collected at all properties. Dust samples will be collected following the procedures provided in American Society for Testing and Materials (ASTM) *Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Structure Number Concentrations* (D 5755-95), as amended for the Libby Asbestos Superfund Site. A copy of this standard ASTM method is provided in Appendix B, with site-specific applications described below (ASTM 1995).

The decision to use microvac sampling, rather than wipe sampling, for the TAPE inspection and sampling was based primarily on the need to collect data that are consistent with data collected for Libby OU4. EPA, and its contractor CDM, have used microvac sampling methods to collect the indoor dust samples at Libby OU4. Microvac sampling methods are assumed to collect samples that more accurately measure releasable asbestos fibers when compared with wipe samples. Each indoor dust sample will be composed of a twenty to thirty-point composite sample, as described in the above-mentioned ASTM standard (ASTM 1995), as amended.

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Comment [CDL43]: If we amend the work plan to reflect 20-30 aliquots, then does the ASTM standard no longer apply? How specific is the standard? Please research and revise as necessary.

4.4.2.1 Select Sampling Locations

The TAPE field team will select sample locations based on the team's visual inspection of the buildings and estimation of where contaminated dust is most likely to be found. The number and locations of dust samples will be selected as described below.

Primary and Secondary Buildings

Dust samples will be collected in every primary and secondary building regardless of whether LA contamination was observed during the visual inspection.

- Two dust samples will be collected on each level of the building's living space (including finished basements):
  - One three-point composite sample will be collected from accessible horizontal surfaces (for example, windowsill, shelving, and cabinets). The TAPE field team will select the surface or surfaces based on factors including proximity to observed VCI and dust accumulation. (Preference will be given to surfaces with higher dust accumulation that are closer to observed VCI.)
  - One three-point composite sample will be collected from high-traffic walkways, which will be selected by the TAPE field team based on the most probably walkway for tracking contamination into the building, including walkways adjacent to entry doors on the main floor. It will include main walkways and corridors between living areas on upper floors and in basements without walk-out access. Walkways may be solid surfaces or covered with rugs and carpets, or a combination. Samples will not be collected from temporary floor coverings that may be routinely cleaned or discarded.
- One twenty to thirty-point composite sample will be collected from each unfinished basement, if present. This sample will be collected from both walkways and horizontal surfaces inside the basement, with specific aliquots selected at the discretion of the TAPE field team.
- One twenty to thirty-point composite sample will be collected from each attached garage or shop, if present. This sample will be collected from both high-traffic walkways and horizontal surfaces inside the attached building, with specific aliquots selected at the discretion of the TAPE field team.
- No dust samples will be collected in attics or crawlspaces with visible LA contamination. Based on extensive sampling and analytical results from Libby OU4, VCI found in attics and crawlspaces is assumed to be contaminated with LA fibers (EPA 2003b).
- The field team may choose to collect additional, targeted dust samples if migrating VCI or localized areas of contamination are is observed in the living space of a primary structure. These data would be used to design small scale vermiculite removal actions if necessary.

Comment [CDL44]: Revise to reflect a single sample per level but higher number of aliquots.

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4.4.2.2 Dust Sample Collection

Collecting a microvac dust sample involves vacuuming dust from a surface and drawing the sample through a filter designed to capture particulates larger than 0.45 micrometers (µm). The ASTM method D5755-95, as amended for the Libby Asbestos Superfund Site, provides the procedural details for properly collecting a microvac dust sample (Appendix B, ASTM 1995).

The microvac device will consist of a battery-operated low-volume sampling pump connected to a 25-millimeter (mm) vacuum dust sampler cassette. The analytical laboratory will provide the cassettes and tubing. The cassettes will contain a 0.45-µm mixed cellulose ester filter. A 6.35-mm diameter plastic tubing will be used to connect the cassette to the pump. A 25- to 37.5-mm length of 6.35-mm diameter tubing will be used to create a "nozzle" on the cassette for sampling. The nozzle tubing will be cut at the sampling end at an approximate 45-degree angle.

The pump will be calibrated each morning in the Tetra Tech field office using a standard calibration device such as a Dry-Cal. The pump will be calibrated using a 25-mm vacuum dust sampler cassette to simulate field operation. The flow rate used for sampling will be approximately 2 liters per minute, which provides an approximate air velocity of 100 centimeters per second through the 6.35-mm diameter tubing. The field teams will be equipped with one back-up pump to ensure proper operation and may return to the field office for recalibration as necessary.

The sampling area for each dust sample point (aliquot) will be 100 square centimeters (cm^2) delineated using a fixed template provided with the sampling cassettes. The aliquot sample will be collected by activating the pump and passing the angled nozzle across the delineated surface for 2 minutes.

Each indoor dust sample will contain twenty to thirty sample aliquots; that is, twenty to thirty separate 100 cm^2 surfaces will be vacuumed using one cassette. The cassette will therefore contain dust from a total 2,000 to 3,000 cm^2 surface area. To collect aliquots, the pump will be turned off and the sampling device moved to the next sample point. Once the next aliquot area has been delineated using a template, the pump will be turned on and the next 100 cm^2 surface area will be vacuumed. When all sample aliquots have been collected, the sampling device will be turned upside down so that any loose dust falls into the cassette. The exterior of the cassette and nozzle will be wiped clean with a wet towel (wet wipe). The cassette will be detached from the pump, the cap returned to the cassette, and the cassette and the nozzle will be placed in a re-closable plastic bag for shipment to the laboratory (see Appendix B for detail). The nozzle will be included in the shipment because significant quantities of dust can remain in the nozzle. The sample will be labeled using the pre-printed sample labels and will be wrapped for return to the Tetra Tech field office. Dust samples will be labeled with a unique sample identification number "TT-XXXXX" where "TT" indicates a "Troy TAPE" sample. Chain-of-custody procedures will be followed as described in Section 5.5.2.

Indoor dust sample point locations will be described and recorded in the TAPE field logbook and on the FSDS and may be photographed and identified on the property sketch at the discretion of the field team.

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Comment [CDL45]: Somewhere on the forms, we need to be able to have the opportunity to identify how many aliquots were collected per sample. This is very important for averages and risk assessment. There may be a huge difference between a dilution of 20 and a dilution of 30 aliquots. Please see e-mail and wait for response to see how this should be handled. We will then need to work with Deb/Randy to make sure our field forms will work.

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4.4.3 Building Materials Sample Collection

4.4.4 Outdoor Inspection

All areas of the Troy properties that are not covered with buildings will be inspected for vermiculite product in soil and surface materials. The areas of the Troy properties that are not covered by buildings will be grouped into four general types: (1) specific use area, (2) common use area, (3) limited use area, and (4) non-use area. Figure 3-2 provides typical outdoor soil sampling designs for these four general types of outdoor areas.

Special attention will be paid to areas where known sources of LA may have been introduced. The property sketch will show the exterior use areas and fences, large trees, or other potential obstructions to potential future remediation. Properties that do not have yards, such as commercial properties, will be described as such on the IFF and in the field logbooks; outdoor areas such as paved parking or driveways will still be inspected. As best identified by the property owner, property boundary lines will also be noted on the IFF and shown on the property sketch.

One member of the TAPE field team will visually inspect each area for the presence of vermiculite product or LA-containing rock while the second team member documents the locations and estimated quantities of observed vermiculite product on the IFF and in the field logbook. Locations of vermiculite product observed will also be noted on the property sketch. Visual outdoor property inspections will not include digging below the soil surface or destructive techniques to investigate underneath asphalt or concrete. It will not be necessary to delineate the vertical extent of contamination because the default excavation depth for remediation of specific use areas is 18 inches below ground surface (EPA 2003b). Similarly, the default excavation depth for remediation of general yard areas, open space, and driveways is 12 inches below ground surface (EPA 2003b).

The field team may elect to photo-document specific conditions on the property for future reference. The property owner will be asked for permission before photographs are taken.

4.4.5 Outdoor Soil Sampling

Comment [CDL46]: Building Materials will NOT be sampled during the TAPE. There is a question on the Interview/IFF form that collects information regarding building materials and LA (there is another question related to crysotile). I think we can just delete this section. Building materials are talked about in other sections but sampling is not mentioned. We'll keep it in other sections as a potential but not talk about sampling the material – we'll just note the potential presence.

Deleted: The TAPE field sampling may encounter some building materials (for example, chinking between log in log homes, special concrete with vermiculite added, and lathe and plaster walls) include vermiculite within the building materials. These special building materials, when encountered, will be sampled and information recorded in the logbook and on a soil-like ... [8]

Comment [CDL47]: Please revise to reflect the modified Visual Verm SOP.

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Deleted: outdoor yards and open space

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Comment [CDL48]: This may be a good place to define the "exterior use areas" from the Visible V ... [9]

Comment [CDL49]: focus on or special attention to "high traffic" areas in the exterior soil sam ... [10]

Deleted: (including fill areas) and to "high traffic areas" where potential LA is likely to be t ... [11]

Deleted: The TAPE field team may further subdivide the outdoor yards and open space by lan ... [12]

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Specific use areas include current and former flower beds, curr ... [13]

After the visual inspection of the property has been conducted, the TAPE field team will collect soil samples from all exterior use areas following the procedures described below and in the Tetra Tech's project-specific guidance (Appendix B). Soil will be sampled regardless of the results of the visual inspection. Soil sampling will include the following steps:

Deleted: special use and yard

Comment [CDL50]: Be sure to update with both the 30-point composite and the definitions of exterior use areas.

- Identify sampling locations
- Collect samples
- Record locations on Troy property map
- Record sample locations using GPS

4.4.5.1 Identify Sampling Locations

TAPE soil samples will be collected as twenty to thirty-point composites with composite subsamples taken from similar use areas. Typical designs for outdoor soil sampling are shown graphically on Figure 3-2. It can be assumed that LA sources would have been distributed across an area, for example by tilling into a yard or garden. A minimum of one twenty to thirty-point composite soil sample will be collected at each Troy property, unless the property has no soil-covered areas (for example, all outdoor areas are paved). A twenty to thirty-point composite will also be collected from each exterior use areas; however, the size and dimensions of the exterior use area may require that less than thirty subsamples be collected for some exterior use areas. In general, twenty to thirty-point composite samples will not cover more than approximately 5,000 square feet. A maximum of five, twenty to thirty-point composite samples will be collected at each property, but additional composite or grab samples may be collected at the discretion of the TAPE field team. The Tetra Tech TAPE field team will use professional judgment to select the appropriate numbers of soil samples to collect at each property. In addition, the TAPE field team will collect all soil samples with the minimum amount of disturbance to the surface. Sod will be carefully removed and immediately replaced after sampling and care will be taken to collect soil samples without disturbing growing flowers and vegetables. To ensure consistency, all TAPE field teams will be provided the same training and guidelines, and training will include "brainstorming" potential property scenarios and discussing proposed sampling approaches.

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Deleted: At least one five-point composite sample will be collected from the yard area.

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4.4.5.2 Collect Soil Samples

Soil samples will be collected from exterior use areas at properties in the Troy OU7. Figure 3-2 provides typical outdoor soil sampling designs for these types of outdoor areas.

Comment [CDL51]: Update figure for 30 point composite

Deleted: (1) outdoor yards and open spaces, and (2) specific

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A typical Troy yard sample will be composed of a twenty to thirty-point composite soil sample collected from the 0 to 1 inch depth. As shown in Figure 3-2, the twenty to thirty individual sample points that will make up each composite sample will be located within a similar land use area, such as the back yard, front yard, or side yard. A minimum of one twenty to thirty-point composite sample will be collected from each Troy OU7 property with a yard. Additional twenty to thirty-point composite samples will be collected when the yards are larger than 5,000 square feet.

A typical open space sample will also be composed of a twenty to thirty-point composite soil sample, as shown on Figure 3-2, collected from the 0 to 1 inch depth. Typical spacing for the individual twenty to thirty-point locations are shown as approximately 30 feet, but this distance can be modified to best fit the land use area. Additional twenty to thirty-point composite samples will be collected for each open space area of approximately 5,000 square feet. The Tetra Tech field team will use professional judgment to select the appropriate number and type of soil samples to collect for each yard and open space. Not all open spaces may be sampled, depending on current and historical uses. To ensure consistency, all field teams will be provided the same training and guidelines, and training will include "brainstorming" potential property scenarios and discussing proposed sampling approaches.

Specific use areas in Troy include outdoor gardens, former gardens, flower-beds, play areas, gravel or dirt driveways, and other areas with potentially greater exposure or greater use of vermiculite amendments. Twenty to thirty-point composite soil samples will be collected from the 0 to 6 inch depth interval in specific use areas. Figure 3-2 presents typical layouts for a garden plot, flower bed, and undefined areas. Typical sample spacing shown on Figure 3-2 is for 10 feet separation, but the distance can be modified to best fit the specific use area. The TAPE field teams will be provided training and guidelines for consistent sampling of specific use areas.

Disposable hand trowels will be used to collect approximately 500 grams of soil sample from the 0 to 1 inch or 0 to 6 inch soil interval at each subsample location for a total of approximately 2.5 kg of soil. If a small metal shovel is required to assist with sampling to 6 inches, the shovel will be thoroughly cleaned and decontaminated after each sample using procedures outlined in Section 5.1. Subsamples will be placed into one re-closable plastic bag and mixed. During sample collection and mixing, the field team will attempt to shield the soil samples from the wind to avoid potentially losing lighter fractions of the soil to the ambient air.

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Comment [CDL52]: Please see e-mail to EPA. This may change.

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Comment [CDL53]: Again, please see e-mail as this may change.

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Comment [CDL54]: This distance may change based on higher number of subsamples

The initial re-closable plastic bag will be placed inside a second bag as a precaution. A pre-printed sample label will be affixed to the outside of the inner re-closable bag as well as the sample ID number written on the outside of the inner bag. The outer re-closable plastic bag will also be labeled and marked similarly using the pre-printed sample ID numbers. Soil samples will be labeled with a unique sample identification number "TT-XXXXX" where "TT" indicates a "Troy TAPE" sample. Chain-of-custody procedures will be followed as described in Section 5.5.2.

The TAPE field team will attempt to restore the land surface to its prior condition after sampling, but Tetra Tech will not be responsible for re-laying sod or replanting. For most sample locations, the small area can be replaced with soil from immediately surrounding the excavation and lightly tamped down. In addition, each TAPE field team will have some commercially-available potting soil or quality topsoil available to repair any small excavations that cannot be easily filled with nearby soil materials. It is not envisioned that sampling will require large-scale disturbance of yards, since the sample size required is small.

4.4.5.3 Record Sample Location on Troy Property Map and with GPS

The field team will mark each soil subsample location on the property sketch with labeling to indicate the composite sample for which the subsample was collected. A backpack-mounted Trimble XRS-Pro GPS will be used to record the midpoint subsample location for each composite soil sample. The GPS location coordinates will be recorded on the GPS unit with a unique identification number that corresponds with the sample point identification number "SP-XXXXXX." The GPS coordinates will also be recorded in the FSDS and field logbook for backup and verification of sample locations.

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Comment [CDL55]: Update with PDA's

Comment [CDL56]: Please indicate the SP#'s for Troy OU7 will begin with 100001 and then go up from there as not to conflict with Libby OU4.

4.4.6 Photography

Each TAPE field team will have a camera for photo-documenting the conditions at a property, if the conditions are not readily described in writing or if, in the judgment of the field team, photographs may assist in development of a remedial action plan for that property. Permission from the property owner will be obtained before any photograph is taken, other than for photographs taken from the public right-of-way.

All photographs will be recorded in the field logbook and on the IFF, and on the property sketch using the following symbol to indicate the position where the photograph was taken and the direction it was taken

Deleted: map

(•→). No accurate distance scales will be used for landscape photographs, but general distances can be estimated by noting the location where the photograph was taken. All photographs will be taken using digital cameras and will be download the same day at the Troy Tetra Tech field office and saved.

Comment [CDL57]: It would be nice, if possible, to expand this one more sentence to indicate how they will be numbered and stored in an organized fashion.

5.0 FIELD QUALITY CONTROL PROCEDURES

Comment [CDL58]: Please add a section on Sample Management as noted in the Site-Wide QAPP.

Section 5.0 describes the methods and procedures for decontamination, quality assurance samples, field documentation, handling investigation-derived wastes, and maintaining chain of custody of samples and records.

5.1 EQUIPMENT AND PERSONNEL DECONTAMINATION

Dust samples will be collected using laboratory-provided filter cassettes with a new cassette and template for each sample collected. The air pump will not require decontamination between samples as a matter of course because of its position behind the sample filter during sample collection. If the exterior of the air pump becomes visibly dusty, it will be wiped clean with a damp paper towel to avoid transferring dust from one location to another.

Disposable scoops and individual sample collection bags will be used for soil and building material sampling; therefore decontamination of the equipment that is in touch with the soil is not necessary. If a small metal shovel is required to assist with sampling to 6 inches in hard, compacted soils, the shovel will be thoroughly cleaned and decontaminated after each sample using a spray bottle with distilled water and paper towels.

Comment [CDL59]: Modify if this depth changes

Visible soil on hands or clothing will be removed by washing with soap and water. Additional personnel decontamination procedures, including requirements for decontamination zones, are described in Section 9.2 of the HASP (Appendix A). PPE will include disposable gloves, disposable protective outerwear, work boots, and respirators. The respirators will be cleaned and decontaminated as discussed in the HASP (Appendix A).

5.2 QUALITY ASSURANCE SAMPLES

Field blank dust samples will be collected at a frequency of one blank sample per 20 samples, or at 5 percent. Field blank dust samples will be collected at locations selected by the TAPE field team, and will be collected by attaching a cassette to the pump and pumping for 1 minute at the same rate as for dust sample collection. However, the cassette will not have a nozzle, and the end of the cassette will be exposed to indoor air at the selected sampling location, rather than passed over a surface of any kind. Data for the field blank dust samples will be evaluated to assess whether a potential exists for airborne asbestos to cause analytical detections of asbestos in dust, or for cross-contamination to occur during sampling.

Dust lot blank samples will also be submitted to the laboratory for each lot or batch of cassettes received from the laboratory. Data for dust lot blank samples will be used to evaluate whether cartridges were received asbestos-free from the laboratory. Tetra Tech will not use a cassette from a given lot until the dust lot blank results confirm the cartridges are asbestos-free.

Comment [CDL60]: Do we get our cassettes from a lab?

Soil field equipment blanks will be collected at a rate of one per calendar week (Monday through Sunday) of sampling per field team. Field equipment blanks will be collected by placing silica sand (that is `asbestos-free as analyzed by polarized light microscopy [PLM]) in a re-closable plastic bag, mixing it with a disposable trowel, and submitted for analysis following the same PLM methods. Data from field equipment blank samples will be used to evaluate whether the disposable equipment is asbestos-free.

Dust lot blank samples and field equipment blanks will be sent to the EMSL Laboratory located in Libby for analysis by method PLM-9002. In addition, during the initial portion of the field work, at least two dust samples per team will be sent to the EMSL Laboratory for rapid analysis. These samples will confirm the field team members are using proper dust sampling techniques.

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Soil field duplicate samples will be collected at a frequency of one sample per 20 composite soil samples or a rate of 5 percent. Field duplicate samples will be collected as samples co-located in the same land use area (yard or landscaped area, for example) and will contain the same number of subsamples (typically twenty to thirty), but will be collected from different subsample locations. Data for soil field duplicates will be used to evaluate the potential variability in LA concentrations in a specific land use area. These data will not be used to evaluate precision in sampling or analytical techniques.

Comment [CDL61]: I know that collocated is a word but others don't!

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All quality assurance samples will be submitted "blind" (labeled as a collected sample) to the laboratory.

5.3 FIELD DOCUMENTATION

Comment [CDL62]: Obviously revision necessary based on PDA's. However, example forms will still be in the Appendix and we may want to keep some on-hand in Troy just in case we need to go back to the old-fashioned way of writing down the info. At least then data entry will be easy.

Example field forms (interview forms, IFFs, and FSDS) are provided in Appendix E. Before the TAPE field activities begin, all members of the Tetra Tech field team will receive the same training on implementation of this Work Plan in general and on use of these forms in particular. Property owner interviews, property inspections, and sample collections will be conducted using these forms to ensure consistency between properties and between TAPE field teams. Use of these forms will also allow compilation of TAPE-derived data into the Libby V2 database (see Section 5.5).

Any additional information that is not recorded on field forms will be recorded in the TAPE field logbooks. Each field team will maintain a field logbook for recording the date and time of each property inspection, the names of the people who allowed property access and completed the interview, the property ID and building ID numbers, the number and type of samples collected at the property including sample ID numbers and FSDS numbers, and any other pertinent information. A new page will be started in the field logbook for each property. The field logbook will serve as an independent (backup) record for all activities conducted and samples collected at a property, in the event that IFFs or FSDSs are lost or damaged. The field logbook will also be used to record additional observations of the field team that relate to potential remedial action at a property, such as locations, quantities and types of suspect asbestos-containing material that is not VCI or LA, and access limitations that were not noted on the IFF. The field log books will be scanned into a PDF format and stored as part of the electronic record for each property.

Comment [CDL63]: Revise text to indicate the Field log books will be numbered with the prefix of TR.

Information will also be recorded on the individual property sketches. Property maps consisting of aerial photos will be provided for reference; however, the quality of the photos does not allow for use as a base map for each property. Property sketches will show the locations of any observed VCI and LA-containing rock, primary and secondary buildings and the main entrance of each building, and the outdoor sample (including subsample) locations. The property sketches will be scanned into a PDF format and stored as part of the electronic record for the property.

Deleted: maps by sketching directly onto the property maps, which will have an aerial photograph base

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5.4 CONTAINMENT AND DISPOSAL OF INVESTIGATION-DERIVED WASTE

Investigation-derived waste will include used wet wipes, wet paper towels, disposable gloves, used respirator cartridges, used plastic tubing, decontamination water, disposable protective outerwear, plastic floor coverings, and other minimal waste. It is possible, but not likely, that these investigation-derived waste materials may contain some asbestos. Therefore, all investigation-derived waste will be double-bagged in appropriate asbestos bags, labeled with asbestos labels, and stored in approved containment at the Tetra Tech field office until it can be properly disposed of at an approved landfill (Lincoln County outside of Libby). Non-sampling waste generated by the TAPE field teams, such as food containers and waste paper, will be separately bagged and disposed of as solid waste at a solid waste landfill.

5.5 RECORD KEEPING AND CHAIN OF CUSTODY

At the end of each day, or more often if required, the TAPE field teams will return to the Troy Tetra Tech field office to download the PDAs (and laptop?) and transfer the dust, building material, soil, and QC samples and copies of the appropriate logbook pages to the Tetra Tech sample coordinator (or the coordinator's designee). An individual file (both paper and electronic) will be maintained for each property inspected. Photocopies of all field forms and appropriate logbook pages in each individual property file will be maintained in the Troy field office for the duration of the TAPE project so that information is available if questions arise. The original forms will be stored in the Tetra Tech office in Helena, Montana, for the duration of the sampling, inspection, and reporting phases of the TAPE project. The original forms will be transferred to DEQ at the end of the TAPE project. Copies of the field forms and field logbook will be available on request at any time during the TAPE project to DEQ, EPA, or to the Troy property owners.

After the field forms have been received from the TAPE field teams, the Tetra Tech Field Data Coordinator will check all paperwork and corresponding location, building, and sample ID numbers for accuracy. The Tetra Tech Field Data Coordinator will then transfer the hard copies of the field forms and the associated dust, building material, and soil samples collected for the Troy properties to the CDM Troy Sample Coordinator. The CDM Troy Sample Coordinator will manually enter the information into the eLastic application for ultimate transfer to the Libby V2 database, pursuant to the eLastic data entry SOP (Appendix B). The CDM Troy Sample Coordinator will conduct a 100 percent data check to ensure that all information has been entered correctly. When the data check is complete, the CDM Troy Sample Coordinator will export the data to the Libby V2 database, via Volpe.

Until samples have been transferred to the CDM Troy Sample Coordinator, all TAPE samples will be held by Tetra Tech. Samples may be stored in locked vehicles or in a secured (locked) area of the Troy Tetra Tech field office. All TAPE samples collected from the Troy properties, including QC samples, will be transferred to the CDM Troy Sample Coordinator at least on a weekly basis. The CDM Troy Sample Coordinator will provide Tetra Tech with a copy of a chain of custody, pursuant to the electronic chain-of-custody SOP (Appendix B). The CDM Troy Sample Coordinator will then transfer the samples to the laboratory for preparation and analysis.

Comment [CDL64]: Please include a sample of the CoC as an appendix.

Deleted: ; the IFFs, interview forms, and FSDSs;

Deleted: All verbal interview forms, IFFs, and FSDSs will be compiled at the Troy field office, photocopied, and the original copies forwarded to the Tetra Tech office in Helena, Montana with a duplicate set of copies forwarded to Volpe on a weekly basis.

Comment [CDL65]: Obvious revisions based on PDA, direct download, on-site prep lab, etc.

Digital photographs will be downloaded daily to a computer at the Tetra Tech Troy field office. Photographs will be downloaded and labeled using a standard labeling procedure that is based on property and building ID numbers. Individual photographs will not be routinely printed from the Troy field office.

6.0 DATA MANAGEMENT

Comment [CDL66]: Please revise Section 6 to accurately reflect the PDA's and Scribe. Marty's revised text and figure is attached as part of these comments.

Data management during the inspection and sampling will be under the supervision of the Tetra Tech TAPE Field Data Coordinator in the Troy field office. At the conclusion of inspection and sampling, that responsibility will pass to the Tetra Tech TAPE project manager.

6.1 DATA REQUISITION

The laboratory will report all analytical data to Volpe and Volpe will oversee integration of that data into the Libby V2 database. Tetra Tech and DEQ will obtain sampling data from the Libby V2 database by requesting that data from Volpe (through EPA) on a standard information request form. Tetra Tech will request the following information from the Libby V2 database for each sample, including QC samples, collected during the TAPE project:

- Sample location
- Sample name
- Sample date
- Sample results
- Identification numbers, dates, and results for laboratory quality control samples

Volpe will provide this information (through EPA) in the standard Libby V2 data report format. All other information necessary for reporting purposes will be obtained from Tetra Tech internal files (copies of IFFs, FSDSs, property sketches, and logbooks).

6.2 DATA REPORTING

Data from the Libby V2 database will be obtained through a geographic information system interface software (ArcView). This interface will provide maps showing all TAPE sample locations. Dust and soil sampling results will be provided from the Libby V2 database in tabulated form, as Microsoft Access files. Tetra Tech will prepare a TAPE project report that describes the activities conducted, the results of the property inspections, and the results of the sampling, evaluates data quality, and recommends follow-up actions. The TAPE project report will include maps for each property where asbestos in soil or in dust exceeded screening levels. TAPE project maps will show sample locations and results for the property and delineate the areal extent of asbestos.

7.0 QA/QC PROCEDURES

The TAPE quality objectives, QC checks and samples, and audits completed for the TAPE project are described in the sections below. Field quality control procedures are described in Section 5.0 above.

7.1 QA/QC OBJECTIVES

The quality objectives of the TAPE project are to obtain 100 percent usable and accurate data. These data will be achieved through inspection and sampling using standardized field forms and procedures, auditing field operations, observing chain of custody procedures, and analyzing field quality control samples and laboratory quality control samples. The DQOs are further discussed in Section 3.0 of this Work Plan.

7.2 INTERNAL QC CHECKS

When laboratory analytical data are received, Volpe will conduct a thorough quality review of that data. Volpe will review data from both laboratory QC samples described below and field QC samples described in Section 5.2. Standard protocols exist for validation of soil samples analyzed by PLM for asbestos and will be followed. Standard protocols do not exist for validation of dust samples for asbestos; however, EPA and their contractors will follow the QC review procedures for dust data established at the Libby Asbestos Superfund Site. EPA and their contractors will prepare validation and review packages for all TAPE data and will transmit the reports to Tetra Tech to be included in the TAPE project report.

Dust and soil samples will be analyzed by one of the contract laboratories following Libby Asbestos Superfund Site protocols, including EPA's most recent protocols relating to QA/QC for the Libby Asbestos Superfund Site. As such, the QA/QC protocols followed by the laboratories are not within Tetra Tech's immediate control.

Laboratory QA/QC samples and standard protocols that the contract laboratory will perform for routine analysis will include appropriate laboratory procedures for the analyses of the following sample types:

- Preparation Duplicate Samples
- Preparation Laboratory Equipment Blanks (grinding and other equipment)
- Method Blank Samples
- Matrix Spike/Matrix Spike Duplicates
- Laboratory Control Samples/Laboratory Control Duplicates

- Standard Reference Material
- Surrogates

Volpe will enter data into the Libby V2 project database with a 100 percent QC of the data.

7.3 AUDITS, CORRECTIVE ACTIONS, AND QA REPORTS

Field audits will be an integral part of Tetra Tech's field operations for the duration of the TAPE project. Field audits and corrective actions will be the responsibility of the Tetra Tech QA/QC manager. (See Section 2.0 and Table 2-1 for designated key project personnel.) The TAPE project report will include a discussion of data quality that will include a summary of field audit results. Copies of field audit forms will be provided as an appendix to the TAPE project report.

7.3.1 Field Inspections and Sampling Procedures Audits

The Tetra Tech QA/QC manager will be responsible for audits of TAPE field inspections and sampling procedures. Audits will be conducted daily for the first 5 days of inspection and sampling and at least biweekly for the duration of the TAPE. Audits will consist of the QA/QC manager or his designee attending a Troy property inspection and sampling event and observing the TAPE field team's activities. The field team will not be warned of the audit. The auditor will compare the field team's activities with the protocols provided in this Work Plan and the attached SOPs and evaluate compliance with the protocols using the audit form provided in Appendix E. After the audit, the auditor will provide the completed audit form to the DEQ and Tetra Tech project managers.

7.3.2 Corrective Action Procedures

The QA/QC auditor may use his or her discretion to provide immediate verbal feedback to the TAPE field team if necessary to ensure that deficiencies are fixed as quickly as possible. The Tetra Tech field team leader and QA/QC manager will review the report with the TAPE field team within 48 hours of the audit to correct any deviations or deficiencies. If any deviations or deficiencies were noted, the field team will be audited again within 1 week of the original audit to ensure that any deficiencies have been fixed.

If gross deficiencies are noted, the Tetra Tech QA/QC manager will determine whether re-inspection or re-sampling of any Troy properties is required. Re-inspection or re-sampling will be required only if the

TAPE field team failed to correctly identify VCI during inspection, collected samples incorrectly, or collected a grossly inadequate number of samples.

7.3.3 Laboratory Audits

The EPA contract laboratories used to analyze the Troy project samples will be required to provide proof of current certifications. Examples of certifications include the following: American Industrial Hygiene Association and the National Voluntary Laboratory Accreditation Program. The verification of laboratory certifications and QC controls will be under the jurisdiction of Volpe or EPA. These agencies are responsible for conducting the laboratory audits if required.

REFERENCES

Comment [CDL67]: I just added all of Aubrey's references at the end. I did not merge them in alphabetical order.

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APPENDIX A

SITE-SPECIFIC HEALTH AND SAFETY PLAN
TROY ASBESTOS PROPERTY EVALUATION

APPENDIX B

STANDARD OPERATING PROCEDURES (SOPs)
TROY ASBESTOS PROPERTY EVALUATION

Tetra Tech - Troy

- Tetra Tech TAPE FSDS and IFF Completion Guidance, Version 01
- Tetra Tech TAPE Soil Sampling Guidance, Version 01

CDM/EPA – Libby

- CDM-Libby-03 Completion of Field Sampling Data Sheets
- CDM-Libby-04 Completion of Inspection Field Forms
- CDM-Libby-05 Site-Specific Standard Operating Procedure for Soil Sample Collection
- CDM-Libby-07 CSF eLASTIC Module

American Society for Testing and Materials (ASTM)

- ASTM D5755-95

Standard Test Method for Microvacuum Sampling and Indirect Analysis of Dust by Transmission Electron Microscopy for Asbestos Building Number Concentrations

APPENDIX C

EQUIPMENT/SUPPLIES LIST
TROY ASBESTOS PROPERTY EVALUATION

APPENDIX D

SAMPLE COVER LETTER, ACCESS AGREEMENT, AND SAMPLE RECEIPT TROY ASBESTOS PROPERTY EVALUATION

APPENDIX E

FIELD FORMS
TROY ASBESTOS PROPERTY EVALUATION

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SITE CONCEPTUAL MODEL

Page 4: [2] Comment [CDL3]	Catherine	2/19/2007 2:56:00 PM

Please include a complete CSM for OU7 similar to that currently used for OU4. The CSM should encompass all possible exposure pathways with descriptive language. Then identify the specific pathway(s) (inhalation) being addressed by this specific Work Plan. See attached document.

Additional comments on the CSM diagram provided by EPA: "Suggest addressing only inhalation pathways for this CSM – in Libby, the inhalation pathway has been prioritized from a risk management standpoint. Additionally, there aren't enough data to characterize the ingestion pathway as minor, nor are all the potential ingestion pathways depicted on the CSM as is stands. The CSM should explicitly include outdoor ambient air and air near disturbed soil (two separate pathways), and they should not be characterized as minor. The CSM should clearly define how contamination ended up in Troy. Potential receptors should be more clearly defined (e.g, residents, tradespeople, etc). Please carefully inspect the CSM for Libby OU4 and consider how it could be amended to represent Troy. Also, please add text to accompany the CSM diagram, discussing exposure pathways and scenarios."

Page 4: [3] Deleted	Catherine	2/19/2007 11:03:00 AM

Asbestos exposure is a potential human health concern because chronic inhalation of excessive levels of asbestos fibers suspended in air can result in lung diseases such as asbestosis and mesothelioma. The relationship between asbestos exposure and mesothelioma has been documented, and at least 70 percent of people with mesothelioma report that they have been exposed to asbestos (National Cancer Institute 2005).

Page 4: [4] Deleted	Catherine	2/19/2007 11:01:00 AM

EPA, CDM, and the Montana Department of Public Health and Human Services (Montana DPHHS) have provided additional related background information for the Libby asbestos project and on mesothelioma in Montana (CDM 2003; Montana DPHHS 2005).

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Field Representative for Volpe Center
Review documents from Troy for consistency with Libby
Respond to resident's requests and concerns in Libby

Page 12: [6] Deleted	Catherine	2/19/2007 10:00:00 AM

EPA Information Center
501 Mineral Ave
Libby MT 59923
(406) 293-6194
Courtney.zamora@volpe.dot.gov

Page 12: [7] Deleted	Catherine	2/19/2007 10:00:00 AM

H&S Manager for Libby Asbestos Project since 2002.
Implement the Project Air Monitoring Program.
Removal Oversight Technical Lead.
Manage the Lincoln County Asbestos Landfill.

Handle regulatory compliance for all dirty work operations and material handling procedures.

Page 37: [8] Deleted	**Catherine**	**2/19/2007 11:56:00 AM**

The TAPE field sampling may encounter some building materials (for example, chinking between log in log homes, special concrete with vermiculite added, and lathe and plaster walls) include vermiculite within the building materials. These special building materials, when encountered, will be sampled and information recorded in the logbook and on a soil-like materials FSDS. The building material samples will be labeled with a unique sample identification number “TT-XXXXX”, where “TT” indicates a “Troy TAPE” sample.

Page 37: [9] Comment [CDL48]	**Catherine**	**2/19/2007 2:56:00 PM**

This may be a good place to define the “exterior use areas” from the Visible Verm SOP.

Page 37: [10] Comment [CDL49]	**Catherine**	**2/19/2007 3:23:00 PM**

focus on or special attention to “high traffic” areas in the exterior soil sampling scheme is not advisable. Investigations must take in to account potential future exposure in addition to current exposures. As such, a systematic sampling scheme (without bias) must be employed.

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(including fill areas) and to “high traffic areas” where potential LA is likely to be tracked indoors

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The TAPE field team may further subdivide the outdoor yards and open space by land use types, such as yards or grassy areas; driveways; parking areas, and filled areas, if known or visible. Sketches will be drawn on the individual property maps to show the separate land use areas.

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Specific use areas include current and former flower beds, current or former gardens, planters, compost piles, play areas, gravel or dirt driveways, and stockpiles. These areas will be included in the inspection. Visual inspections of specific use areas will include limited digging below the soil surface with the least disturbance possible.

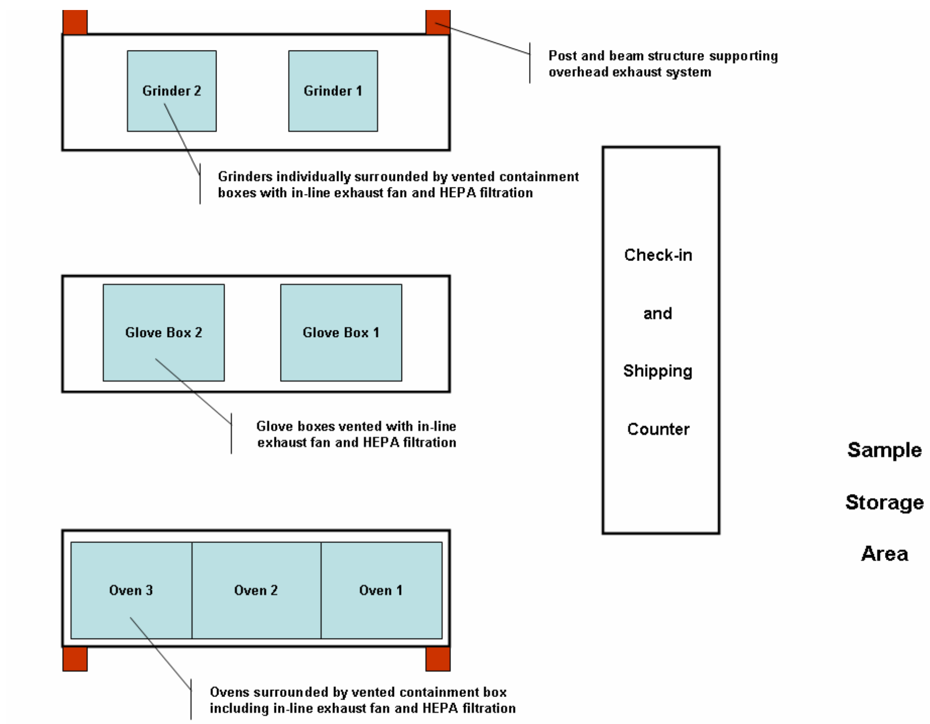
United States Environmental Protection Agency, Region 8

Troy Pre-Deployment Sample Preparation Work Plan

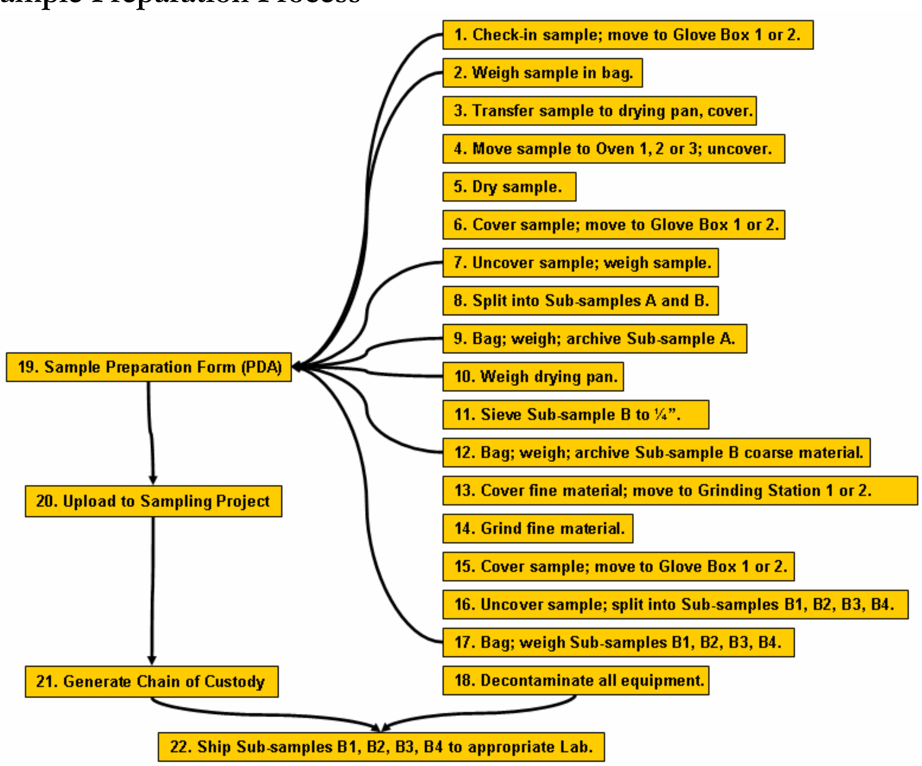
Prepared by: Martin McComb, EPA Region 8
Presented to: Catherine LeCours, MT DEQ

Updated February 18, 2007

I. Sketch of On-Site Sample Preparation Lab



II. Summary of Sample Preparation Process



Comments:

- ESAT will be on-site in Troy to process samples during the following periods of the 2007 field season:
    - April 16 – April 20 (mobilization and set-up)
    - April 30 – May 11
    - June 4 – June 15
    - July 9 – July 20
    - August 20 – August 30
    - September 24 – October 5 (includes de-mobilization)

- G. Saunders, EPA Golden Lab, will provide Health and Safety oversight. The work space and individual personnel will be sampled daily for exposure.

- At the end of the 2007 field season, ESAT will demobilize and transport all equipment to the EPA Golden Lab. During the off season, ESAT will process samples on an as needed basis using the Region 8 Mobile Laboratory parked on the premises of the EPA Golden Lab.

III. Pre-Deployment Work Plan

Deadline	Lead	Task
March 16	ESAT	1) Develop SOP. 2) Develop Health and Safety Plan. 3) Schedule staffing.
March 30	R8	4) Approve SOP and Health and Safety Plan. 5) Procure equipment.
April 13	ESAT/R8	6) Off-site equipment preparation. 7) Conduct training.
April 20	ESAT/R8	8) On-site set-up.

IV. Equipment and Supply Budget

Item	Source	ID	Unit Cost	Number	Total Cost
Heavy Duty Plate Mill Grinder (grinds to 75 - 100 mesh)	Cole-Parmer	K-04186-00	$1,900.00	2	$3,800.00
Economy Gravity Convection Oven (5.7 cu ft)	Cole-Parmer	K-52120-06	$1,300.00	3	$3,900.00
Ambient Air Sampler	?	?			
Replacement Tooth Feed for Grinder	Cole-Parmer	K-04186-54	$72.00	3	$216.00
Fine Replacement Plate for Grinder	Cole-Parmer	K-04186-50	$48.00	3	$144.00
Neoprene Gloves size 9.75 (for custom glove boxes)	Cole-Parmer	K-09112-13	$284.00	4	$1,136.00
Construction materials for custom glove boxes, containment boxes, and exhaust ventilation	Home Despot	n/a	$1,200.00	1	$1,200.00
Tyvek Coveralls with elastic cuffs, hood, and boots - Medium	Cole-Parmer	K-86225-35	$6.75	25	$168.75
Tyvek Coveralls with elastic cuffs, hood, and boots - Large	Cole-Parmer	K-86225-36	$6.75	100	$675.00
Tyvek Coveralls with elastic cuffs, hood, and boots - X-Large	Cole-Parmer	K-86225-37	$6.75	25	$168.75
3M Series Maintenance-Free Respirator - Small	Cole-Parmer	K-40112-61	$33.50	2	$67.00
3M Series Maintenance-Free Respirator - Medium	Cole-Parmer	K-40112-63	$33.50	10	$335.00
3M Series Maintenance-Free Respirator - Large	Cole-Parmer	K-40112-65	$33.50	3	$100.50
P100 Respirator Cartridges (2 packs)	Cole-Parmer	K-40113-70	$21.00	30	$630.00
HEPA filters for box exhaust system	?	?			
Personal Air Samplers	?	?			
				TOTAL:	**$12,541.00**